

Third generation closed center load sensing is here...today

The time has arrived when you can move up to higher levels of vehicle performance by incorporating the Vickers CMX load sensing controls in your next design. It's no longer necessary to demand that the machine operator demonstrate outstanding skills to obtain maximum performance.

By incorporating advanced state-of-the-art valve element concepts, the CMX provides "velvet smooth" controllability of the raw brute force available from your hydraulic system. No other system offers the flexibility to easily tailor individual function control to your exact needs!

Today's load sensing systems will dramatically reduce the overall power requirements of your machine's hydraulic system by eliminating unnecessary losses when multiple unequal loads are operated simultaneously.

However, care must be taken to insure proper phasing to avoid unnecessary power waste in unequal displacement functions such as typical cylinder applications. Competitive systems require careful and lengthy spool development to match each operating section to its specific functional load requirements. Since each spool must be matched to its individual function, service support is costly.

The CMX family has been designed from the first line on the computer screen with your needs in mind. Thanks to its modular element construction, it can be easily tailored to your exact specifications. Prototype system development and debugging is reduced to a matter of days rather than the traditional weeks or months necessary with competitive designs. On-site service is a breeze. Service and production support inventory is dramatically reduced.

And best of all, it's available today in all the popular basic and optional configurations, just the way you want it. Hydraulic or electrohydraulic controls, mid-inlets, and mixed flow arrangements are just a few of the almost endless features available.

This application guide has been developed to assist in selection of the features desired to meet your system requirements. Consult your Vickers sales representative if special features beyond those shown are desired.

Contents

General Description	3
Inlet Bodies	
End inlet body - standard	4
End inlet body with load sensing relief valve	5
Mid-inlet	6
Standard mid-inlet	6
Mid-inlet with reducing valve and anticavitation make-up flow	7
Valve Sections	8
Meter-in elements	11
Flow control meter-in elements	11
Pressure control meter-in elements	17
Pressure compensated pressure control spool	21
Flow limitation orifice	22
Load sensing check valves	24
Load drop check valves - standard	26
Load drop check valves with bleed orifice	28
Meter-out elements	28
Anticavitation check valves - standard	33
Anticavitation module	35
Float function	36
Meter-out spool	38
Actuator port relief valve	40
Hydraulic actuation	45
Electrohydraulic actuation	46
End Cover	52
Special Features	53
Meter-in pressure limitation	54
Meter-out poppet version	54
Meter-out spool version	56
Swing drive with free coast	57
High flow single acting CMX	57
Swing drive with pressure controlled braking	61
Free coast operation in neutral	67
Model Code	
Valve sections	69
Valve banks	70
Port Sizes	71

Detailed description of CMX sectional valves

General description

The CMX sectional valve is a stackable, load sensing, proportional directional control valve, and can be operated by hydraulic remote control (HRC) or electronic remote control (ERC) via integral electrohydraulic reducing valves.

A characteristic feature of the CMX valve line is the concept of separate meter-in and meter-out elements (Figure 1). The meter-in element is a pilot operated, pressure compensated, proportional sliding spool and controls fluid from the pump to the actuator. The meter-out elements are pilot controlled metering poppets, and control exhaust fluid from the actuator to tank. Each meter-out poppet functions as a variable orifice between one of the actuator's ports and the tank port, with the degree of opening proportional to the pilot signal.

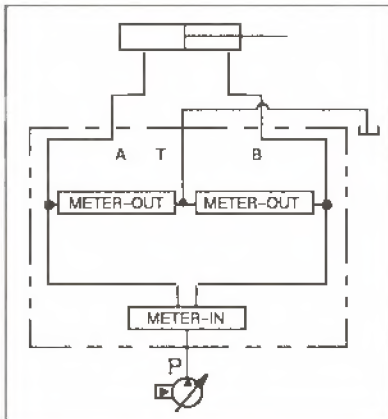


Figure 1. Basic CMX Concept

The separation of the meter-in and meter-out elements, plus the valve's modular design, permits a broad range of control options to meet a variety of load requirements. This is especially desirable for a stackable mobile valve, where a single valve bank must handle many different functions.

The CMX sectional valve family consists of two basic series with different flow ratings - the CMX100 and the CMX160. These valves are functionally identical, with most differences being due to the differences in their physical size.

A CMX valve bank is made up of an inlet body, from one to eight valve sections, and an end cover (Figure 2). The valve sections are connected internally to common pressure, tank, load sense, pilot supply and pilot drain passages. Face seals between the sections seal the connecting passages, and the sections are held together by tie rods and nuts. Threaded mounting bolt holes are provided on the inlet body and end cover.

The pump, tank, load sense and electrohydraulic pilot supply passages are terminated in the inlet body, and the pilot drain is terminated in the end cover. Connections for the actuator and the HRC are made at each section. Electrical connections for electrohydraulic valves are made at each coil. HRC and ERC controlled valves can be used in the same valve bank.

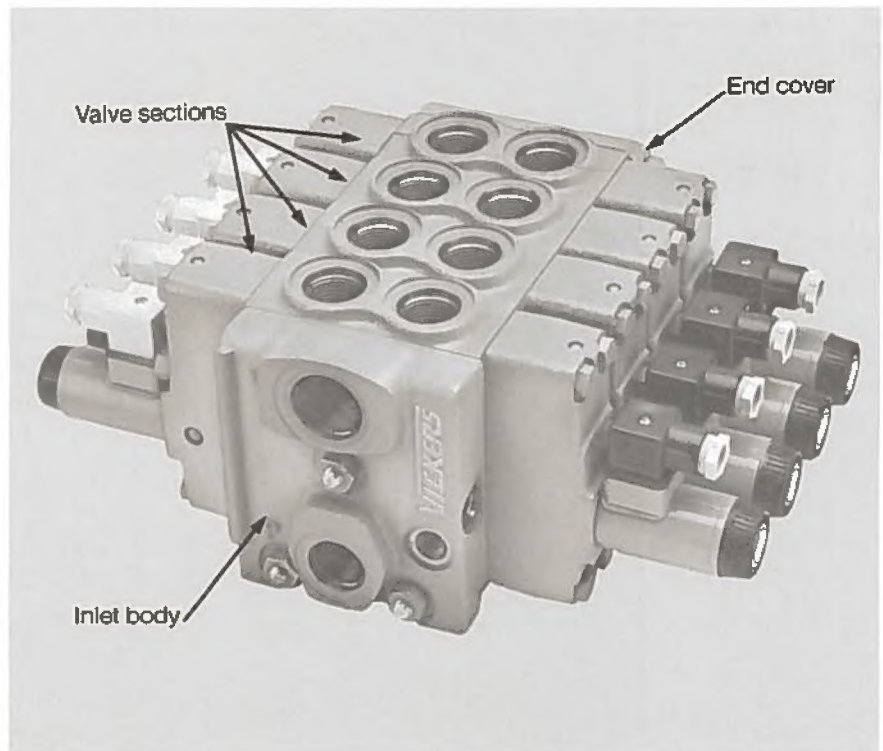


Figure 2

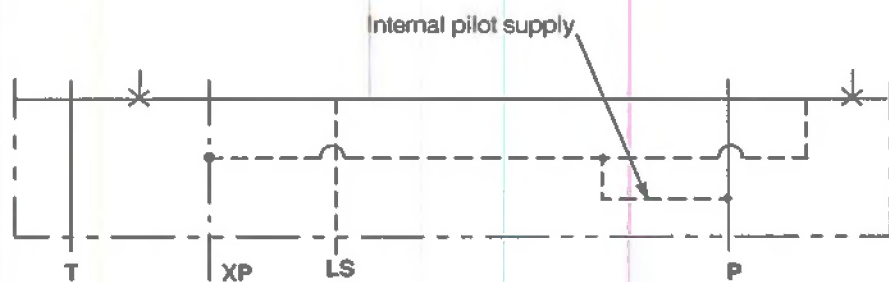
Inlet bodies

Standard end inlet body

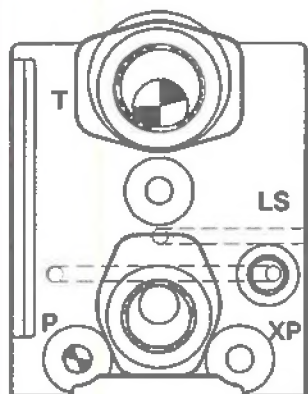
The standard inlet body (Figure 3) provides connections for pump, tank and load sense. On electrohydraulic

valve banks, a connection is also provided for pilot supply, which may be internal or external. For internal pilot supply, an internal passage connects the pilot supply to the pressure port. For external pilot supply, this connecting passage is blocked by a

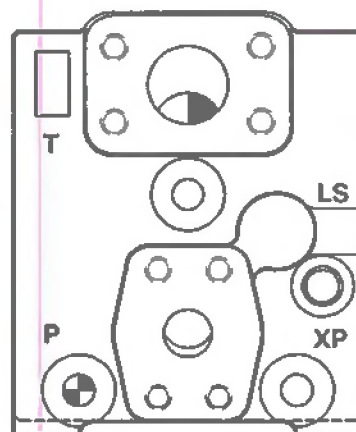
1/4-28 UNF set screw (.125 in. hex key) accessible through the pump port, and the "XP" external connection is made through a #6 SAE O-ring boss port (.563-18 UNF-2B thread). Refer to Port Sizes table at the end of this document for other sizes.



Standard end inlet schematic



CMX100



CMX160

Figure 3

End inlet body with load sensing relief valve (CMX100 only)

This inlet body (Figure 4) is designed for use with fixed displacement pumps to provide a combined function similar to a variable displacement load sensing pump, but at a lower system cost. In addition to the system connections for pressure, tank, optional load sense and optional external electrohydraulic pilot supply, the inlet section incorporates a load sensing relief valve that maintains inlet pressure at a fixed level above load sense pressure, and limits maximum inlet pressure to a preset value.

The load sensing relief valve uses a balanced spool concept to control inlet pressure. Load sense pressure from the valve bank is admitted to the spring chamber via a 1.27 mm (.050") orifice.

Load sense pressure plus the spring load is balanced against the inlet pressure on the opposite end of the spool. When the load sense pressure plus spring force is overcome by the inlet pressure, the spool opens allowing inlet flow to tank, thus controlling inlet pressure. When the pre-set maximum pressure is reached in the spring chamber, the pilot poppet opens, limiting the spring chamber pressure (and then the inlet pressure) since the LS flow into the spring chamber is controlled by the .050" orifice. Note that the pre-set maximum pressure must be matched to the spring(s) used, so the spools are not interchangeable.

Two springs are available, which may be used separately or as a nested pair to give three inlet-to-load sense pressure differential settings: 10 bar (145 psi), 16 bar (232 psi) and 26 bar (377 psi). The load sensing relief valve is rated at 250 bar pressure (3625 psi).

An optional solenoid operated unloading valve is also available which provides a direct path to tank when pump "standby" pressure is not desired. The unloading valve provides a 4.7 bar (68 psi) pressure differential at 100 lpm (26 USgpm) and is open "P" to "T" when the solenoid is de-energized. The unloading valve is pressure rated at 205 bar (3000 psi).

An optional external load sense connection is available for special applications. Load sense connections from other valve banks should be made at the end cover when a load sense decompression orifice is used to decompress the load sense passage. The load sense decompression orifice should be located as far as possible from the load sensing relief valve (see page 25).

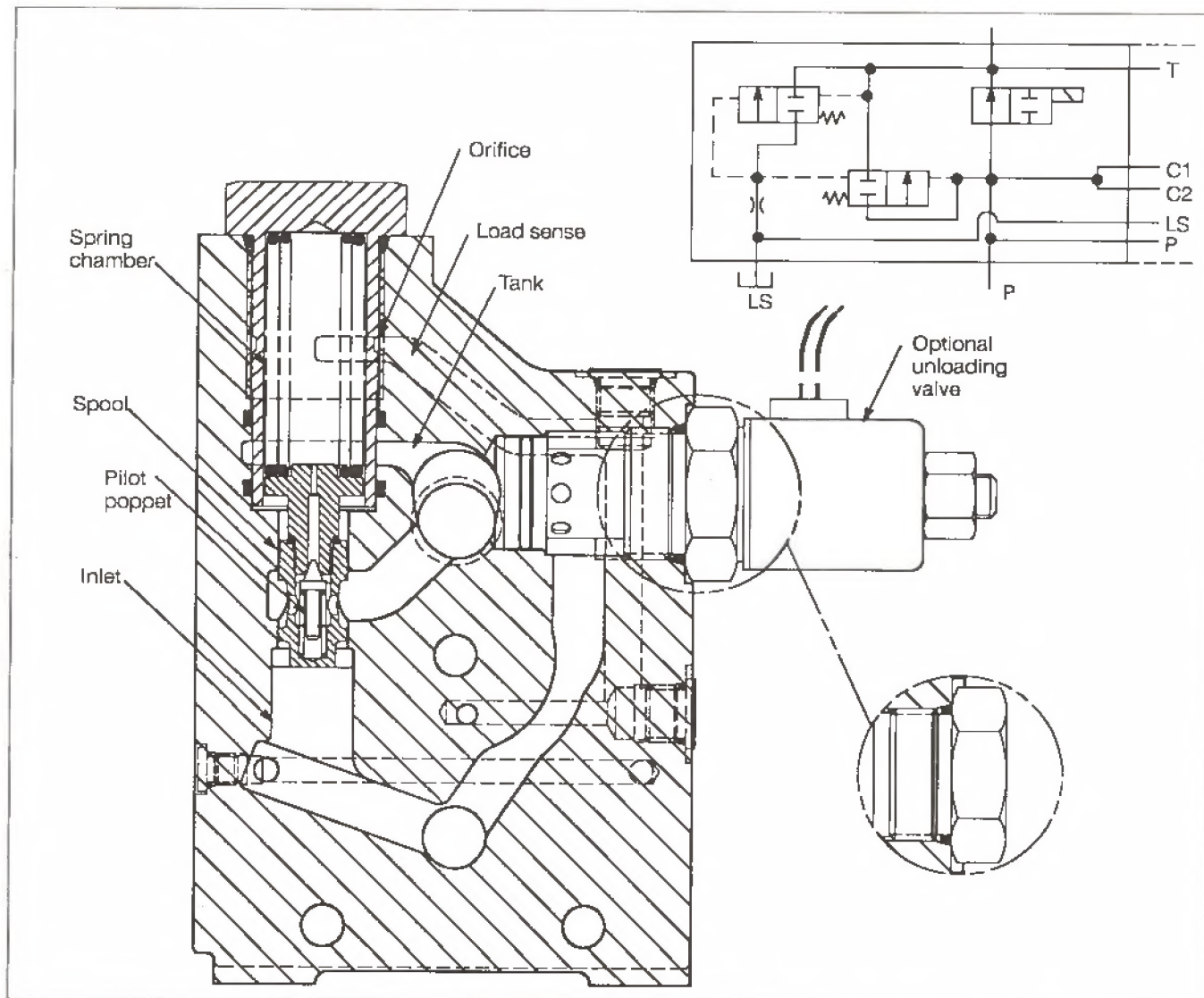


Figure 4

CMX160/100 mid-inlet

The mid-inlet (Figure 5 and 6) facilitates the use of CMX160 and CMX100 valve sections in the same valve bank. The CMX160 sections are mounted on one side of the mid-inlet, and the CMX100 sections are mounted on the opposite side. System pressure and tank connections are made in the middle of the valve bank, rather than on the end.

Standard mid-inlet

The standard mid-inlet (Figure 5) provides connections for pump, tank and external pilot supply (for electrohydraulic valves). Internal pilot supply is available by omitting a set screw plug in a connecting passage between the pump port and pilot supply passage, and plugging the external pilot port. Load sense and external drain connections for mid-inlet valve banks are made at the end covers.

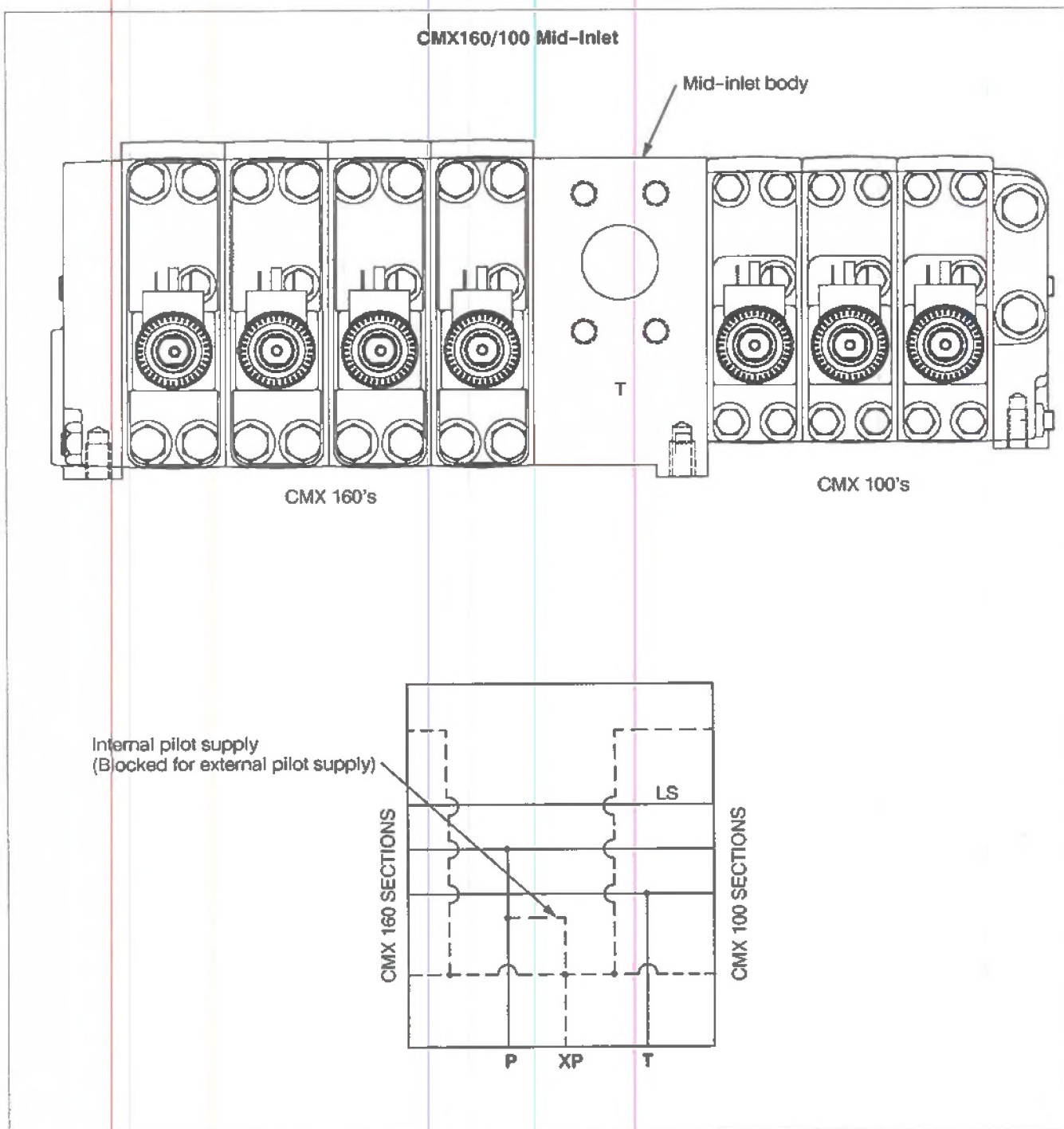


Figure 5

Mid-inlet with reducing valve and anticavitation make-up flow

This mid-inlet (Figure 6) incorporates two reducing/relieving cartridges to provide pilot supply pressure and tank port make-up flow. The reduced pilot supply pressure can be supplied internally to electrohydraulic sections

and/or ported externally to HRC pilot supply ports. The tank port make-up flow is directed to the tank passage to maintain a minimum tank pressure under all operating conditions.

Make-up flow is an anti-cavitation feature. It is required in circuits where an overrunning load is causing an actuator to move and draw more fluid from the tank port than is being

returned by the opposite actuator port, and a check valve in the tank line prevents fluid from being drawn from tank. (A swing function powered by a hydraulic motor is a typical circuit that requires make-up flow.) The reducing valve should be set 0.69 bar (10 psi) below the back pressure check valve setting.

CMX160/100 Mid-Inlet

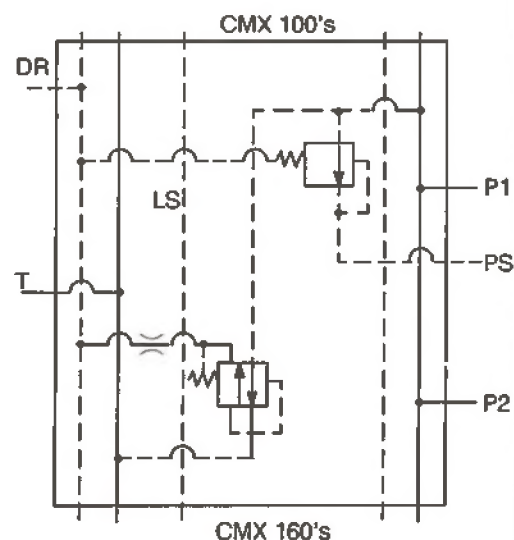
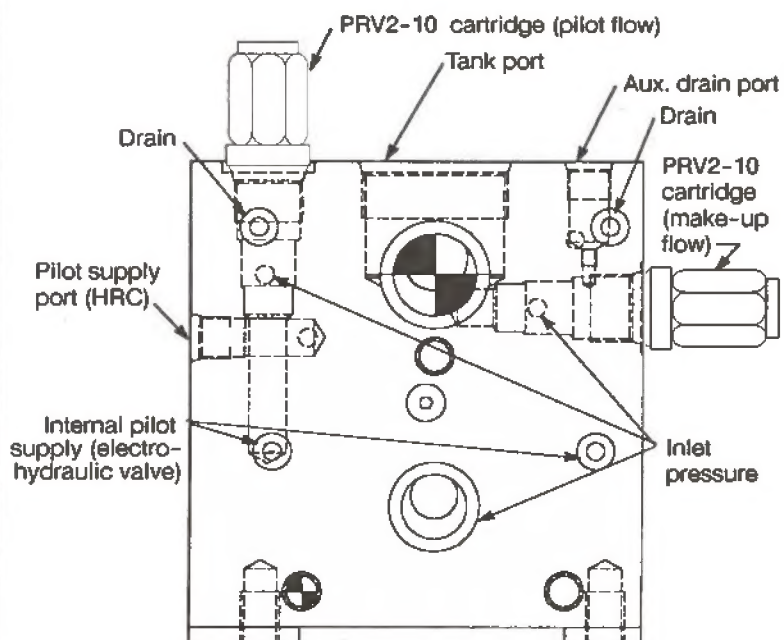
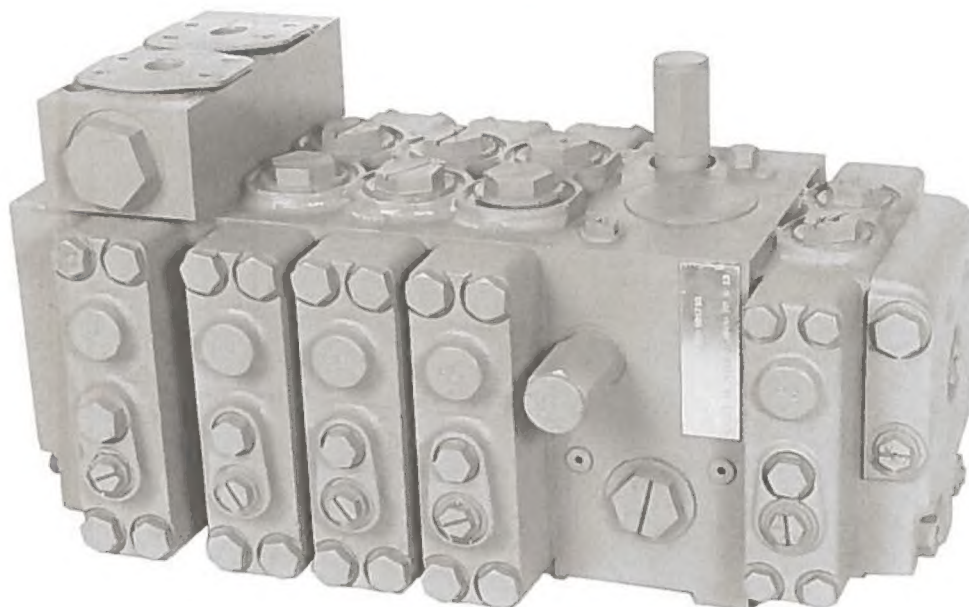


Figure 6

CMX valve sections

The CMX valve section consists of three basic parts: the main valve body, which contains the main flow passages and main control elements, and two control caps, that contain the pilot circuitry. The

control cap gaskets (Figure 7), which provide a seal between the control caps and the main valve body, are also part of the pilot circuit, providing a passage from the meter-in spring chamber to the relief valve pilot stage and the meter-out servo. This format allows for

a wide variety of control options for relatively few basic parts; thus the valve can be tailored to the application at minimal extra cost.

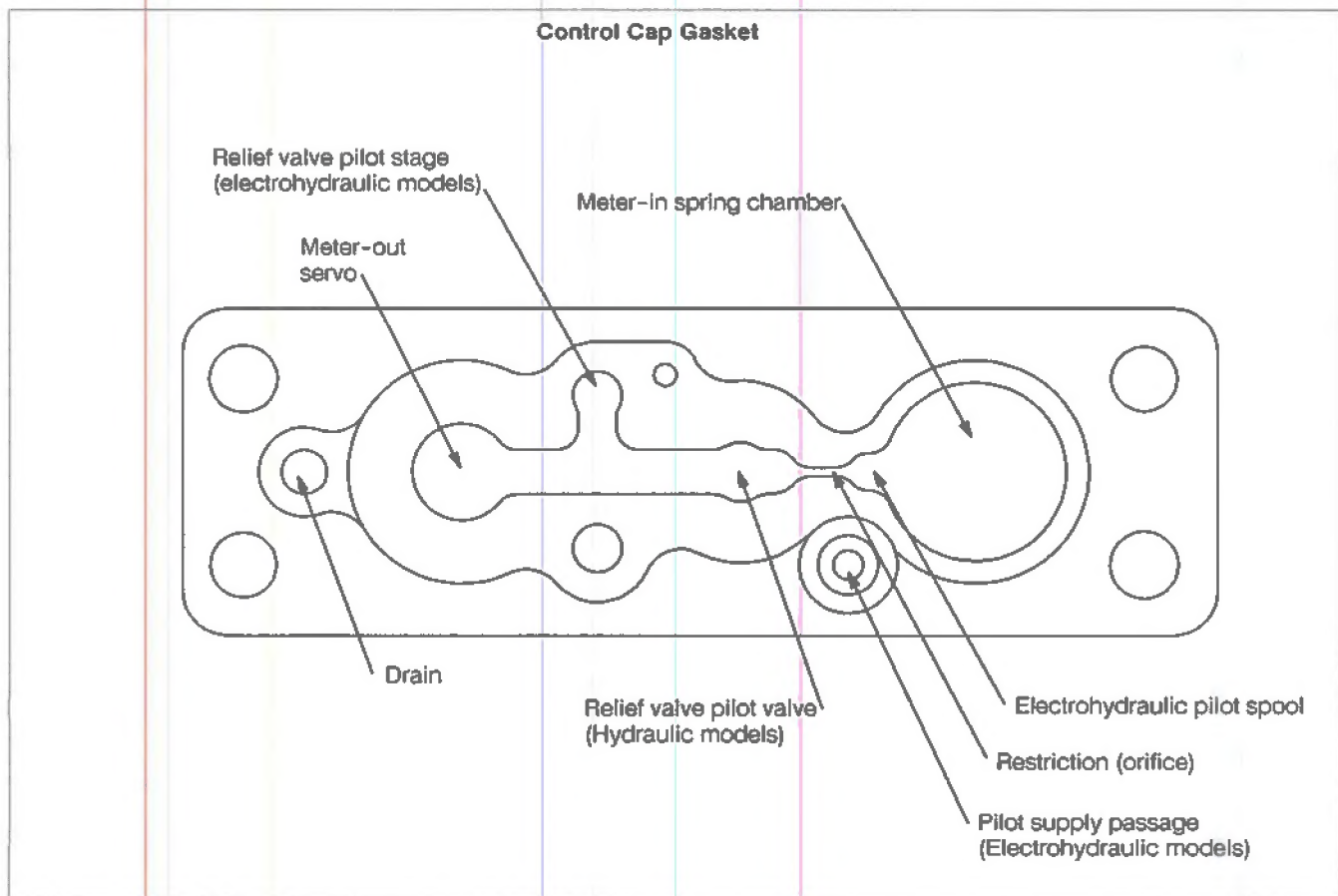


Figure 7

Cutaway views of the hydraulic and electrohydraulic versions of the CMX are shown in Figures 8 and 9, along with schematic diagrams. The relief valve pilot stages are shown in detail in the schematic diagrams used in this

discussion to promote a better understanding of the valve's operation.

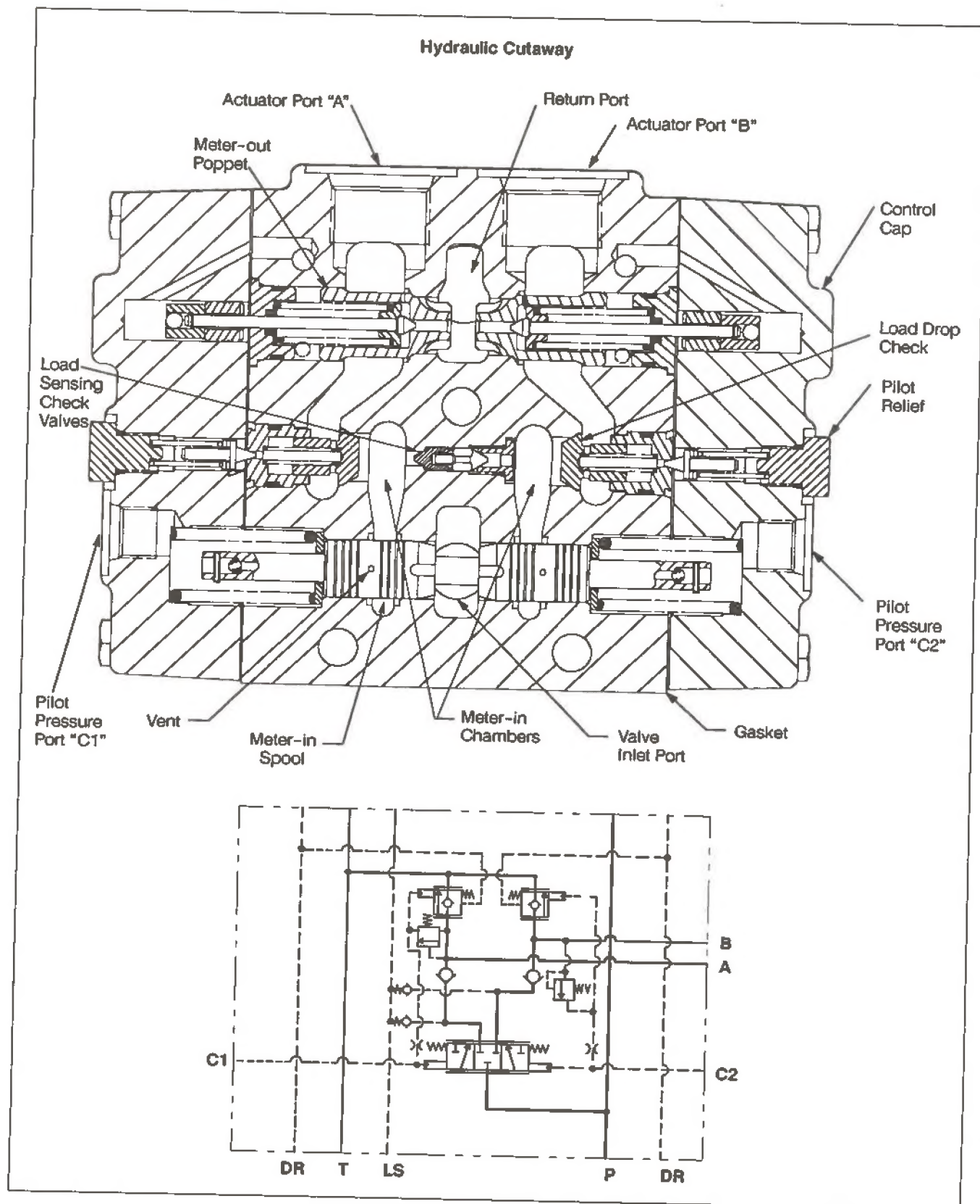


Figure 8

CMX Electrohydraulic Valve Section

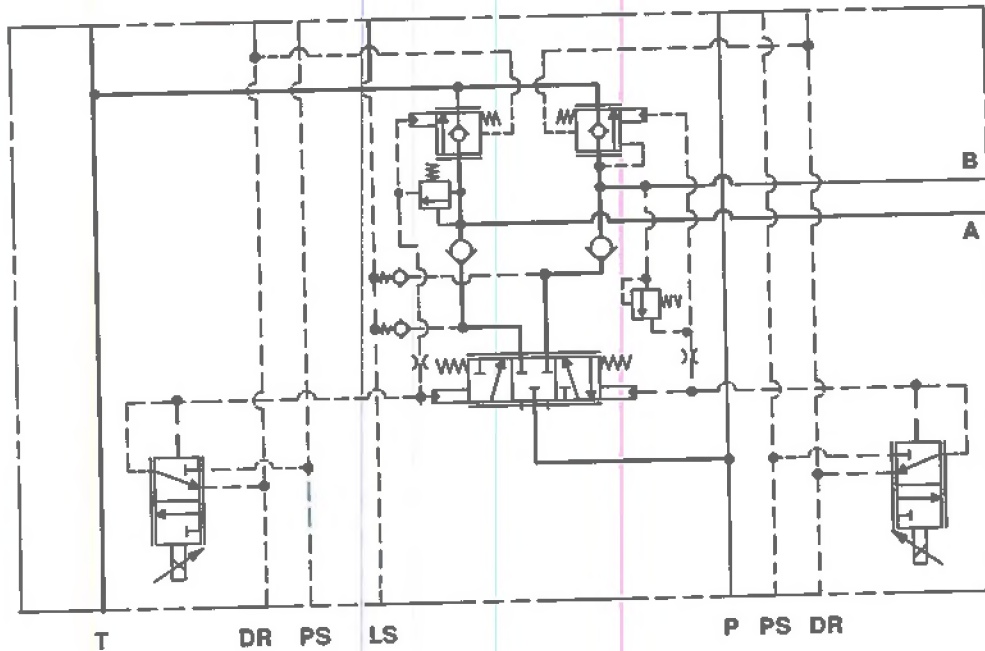
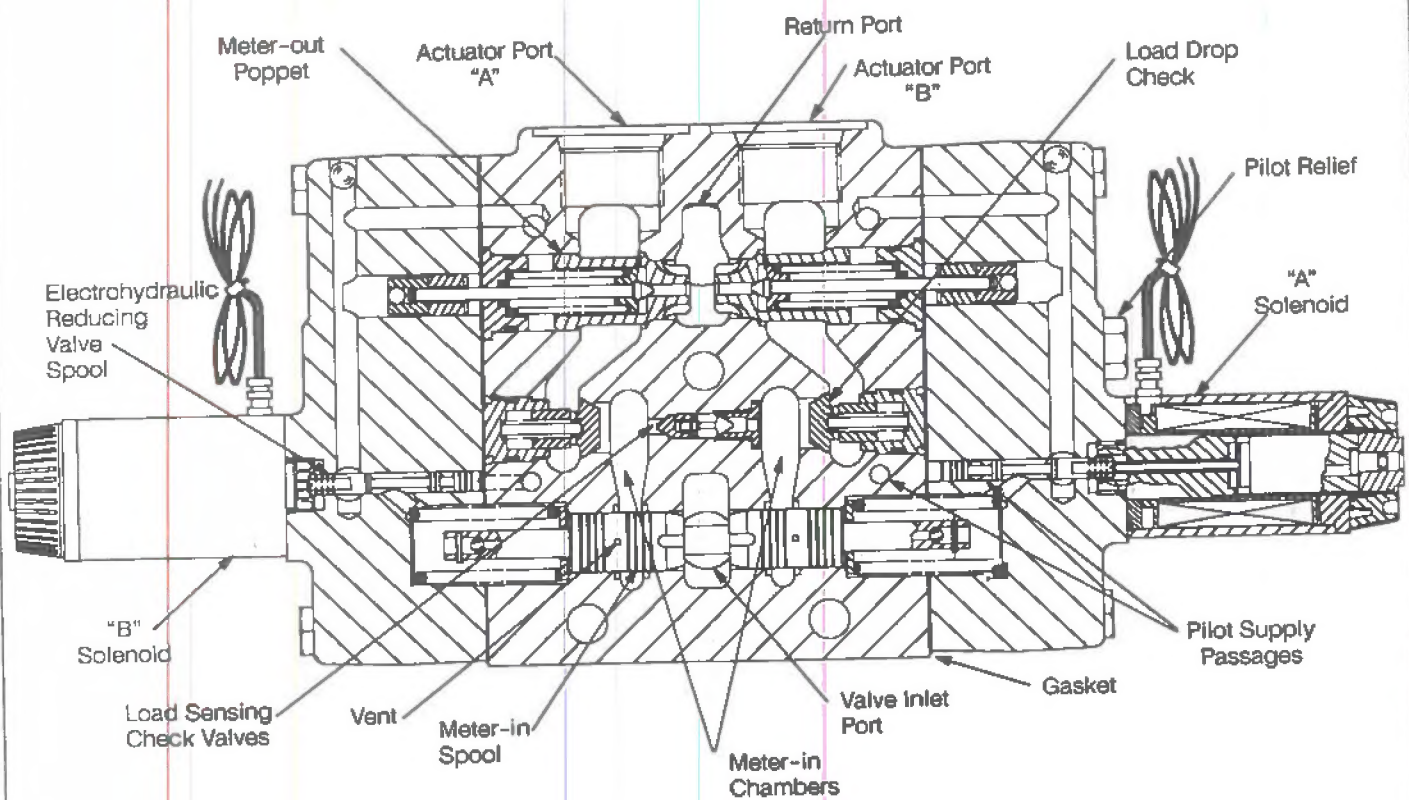


Figure 9

The main valve body is available as a narrow body with an actuator port pressure rating of 250 bar (3625 psi), or as a wide body with an actuator port pressure rating of 380 bar (5510 psi) and an inlet port pressure rating of 350 bar (5075 psi). Valve sections with different pressure ratings can be used in the same valve bank. Pressure ratings and sizes are tabulated below.

Valve series	CMX100			CMX160		
Port code	S	F	FL	S	F	FL
Body thickness	47mm	59mm	59mm	51mm	75mm	75mm
Max. pressure	bar (psi)	bar (psi)	bar (psi)	bar (psi)	bar (psi)	bar (psi)
Actuator port	250 (3625)	380 (5510)	250 (3625)	250 (3625)	380 (5510)	250 (3625)
Inlet port	250 (3625)	350 (5075)	250 (3625)	250 (3625)	350 (5075)	250 (3625)
Drain/tank port	35 (508)	35 (508)	35 (508)	35 (508)	35 (508)	35 (508)
C1/C2 port	35 (508)	35 (508)	35 (508)	35 (508)	35 (508)	35 (508)
Electrohydraulic pilot supply port	250 (3625)	250 (3625)	250 (3625)	250 (3625)	250 (3625)	250 (3625)
Actuator port size	.75" SAE str. thd. O-ring boss (1.063-12 UN-2B thd)	.50" Code 62 SAE 4-bolt flange	.50" Code 61 SAE 4-bolt flange	1" SAE str. thd. O-ring boss (1.313-12 UN-2B thd)	.75" Code 62 SAE 4-bolt flange	.75" Code 61 SAE 4-bolt flange

The operating elements in the CMX sectional valve can be divided into five functional groups: meter-in, meter-out, load drop check valves, load sense check valves and relief valve pilot stages. The electrohydraulic version includes additional solenoid operated proportional reducing valves to provide pilot control pressure. Each functional group is described in the following pages.

Meter-in elements

The meter-in element ports fluid from the valve inlet port to the "A" or "B" meter-in chamber. The meter-in element is a pilot operated, spring centered, proportional sliding spool. The inlet port is closed in neutral. Two different springs are available to provide different meter-in cracking pressures (the pilot pressure required to begin flow from the inlet to an actuator port). The area gain (or slope of the metering curve) is the same for both springs. The meter-in element is available as a flow control type ("S0**") or a pressure control type ("S***").

Low flow spool options are available for both the flow control meter-in element ("L0**") and the pressure control meter-in element ("L***"). The low flow option provides finer metering and lower flow capability than the standard "S***" spool for functions where the full flow capability of the valve is not desired. Low flow spools are available for the CMX100 only.

Flow control meter-in elements "S0" and "L0"

The flow control element (Figure 10) provides nearly constant flow for a given command signal, independent of pressure drop across the meter-in spool and independent of load pressure. Flow is proportional to command pilot pressure differential. Pressure compensation, which is achieved by utilizing flow forces, minimizes load interaction caused by the simultaneous operation of more than one function.

For certain applications such as brake release circuits, single acting cylinders, and counterbalance circuits, it is necessary to drain the meter-in chambers to prevent pressure build-up and subsequent actuator movement. When required, meter-in spools that vent fluid in the meter-in chamber are available. In these "vented" spools, fluid passes through an orifice to the center of the spool to the pilot pressure ports, where it is drained to tank via the HRC (hydraulic pilot models) or the reducing valve (electrohydraulic models). Ball check valves prevent reverse flow through the vent when pilot pressure is applied to spools. Performance data is given in Figures 11, 12 and 13.

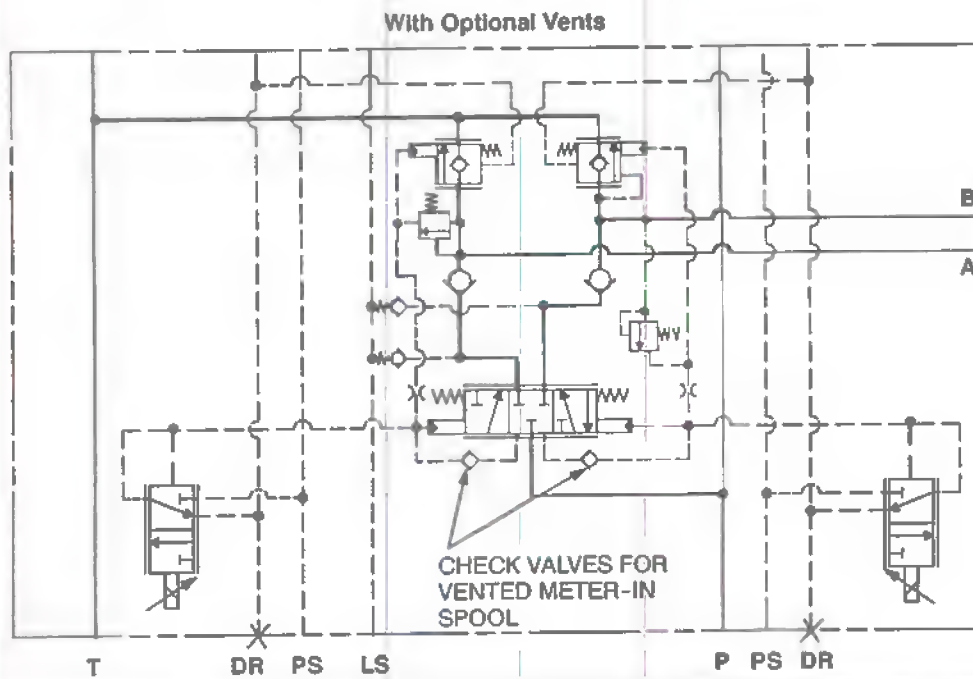
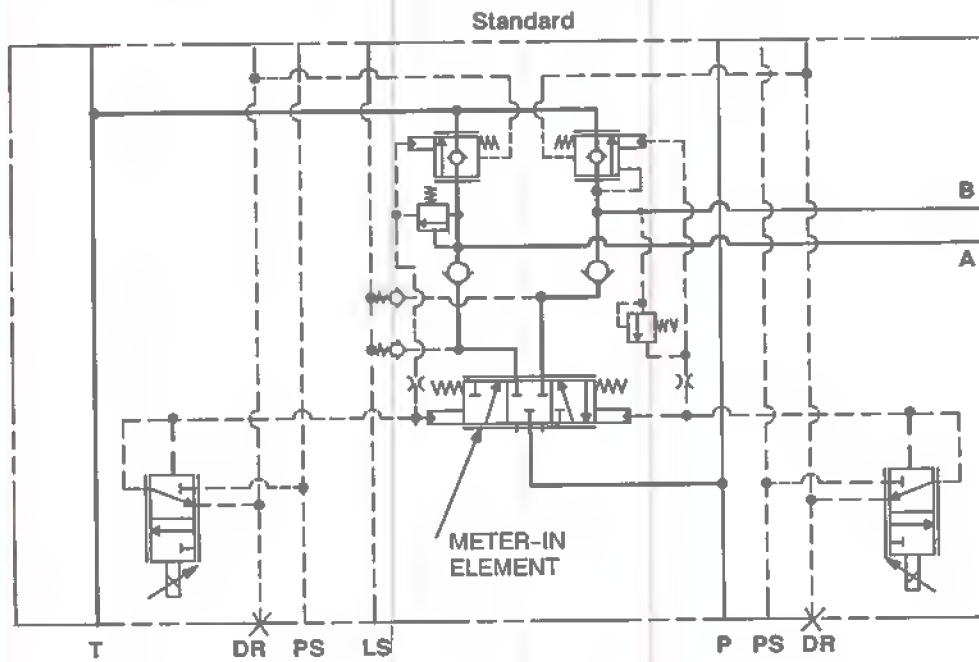
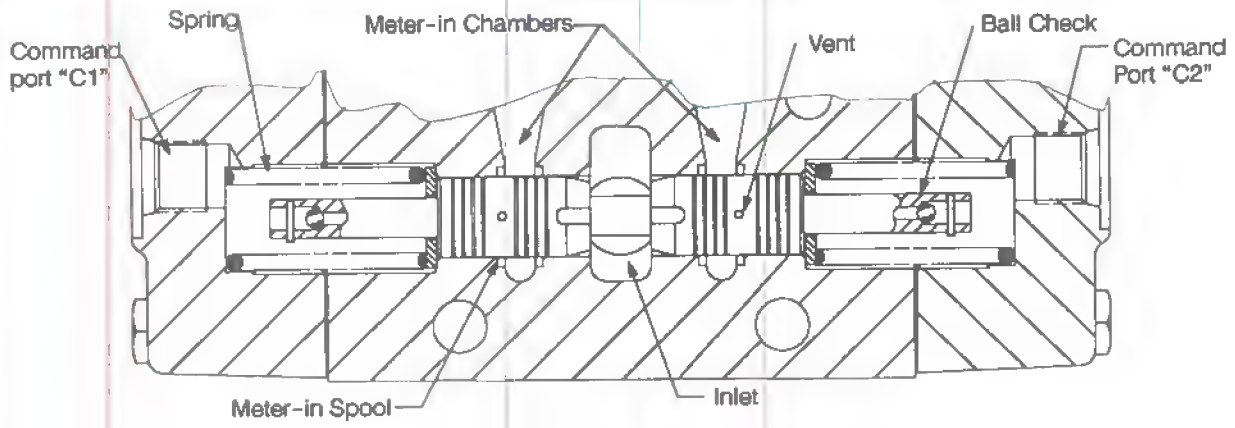


Figure 10

CMX METER-IN FLOW vs. COMMAND AT 20 BAR P-LS PRESSURE DIFFERENTIAL

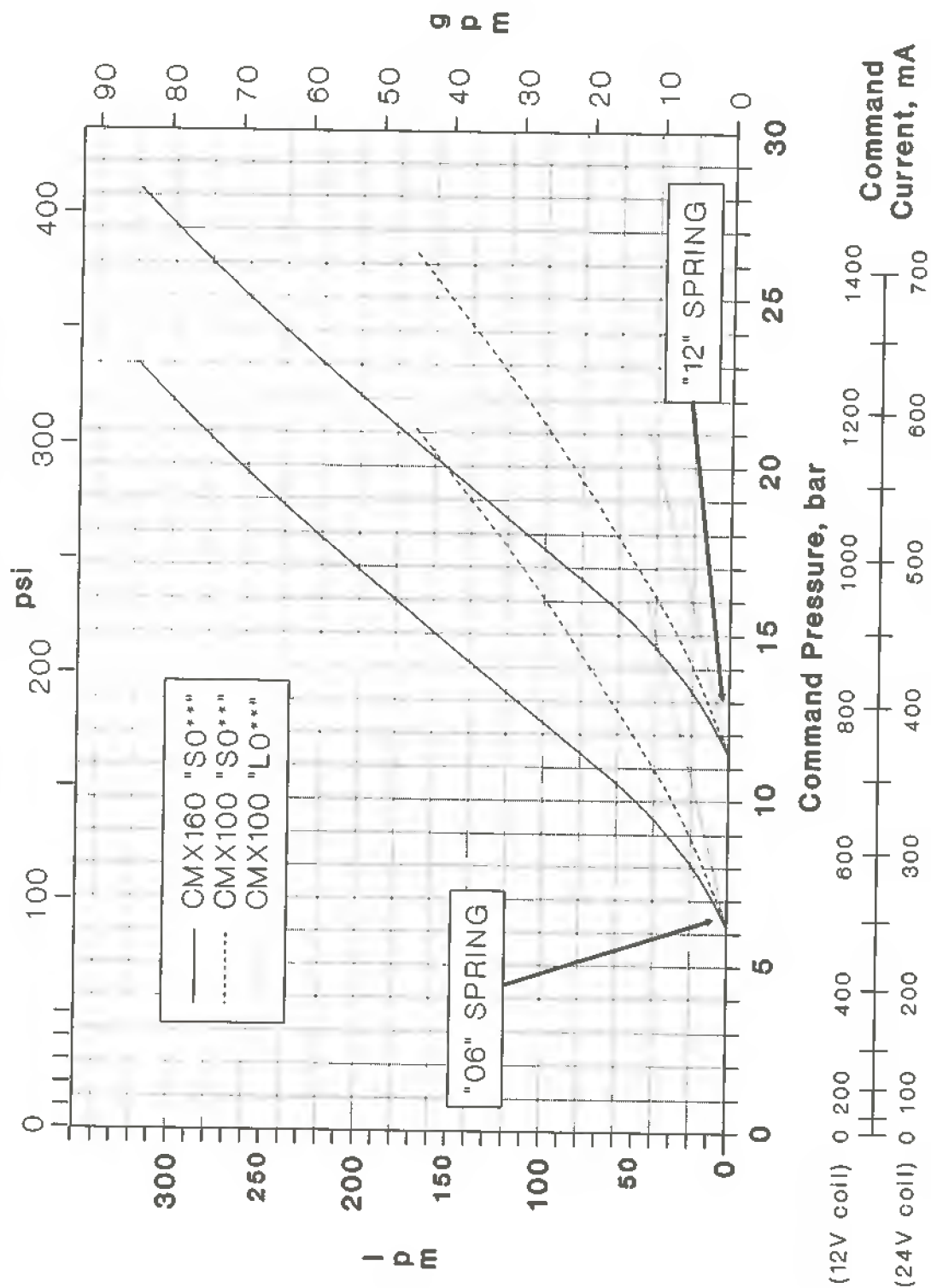


Figure 11

**CMX100 METER-IN PRESSURE COMPENSATION
MODEL "S006" METER-IN ELEMENT**

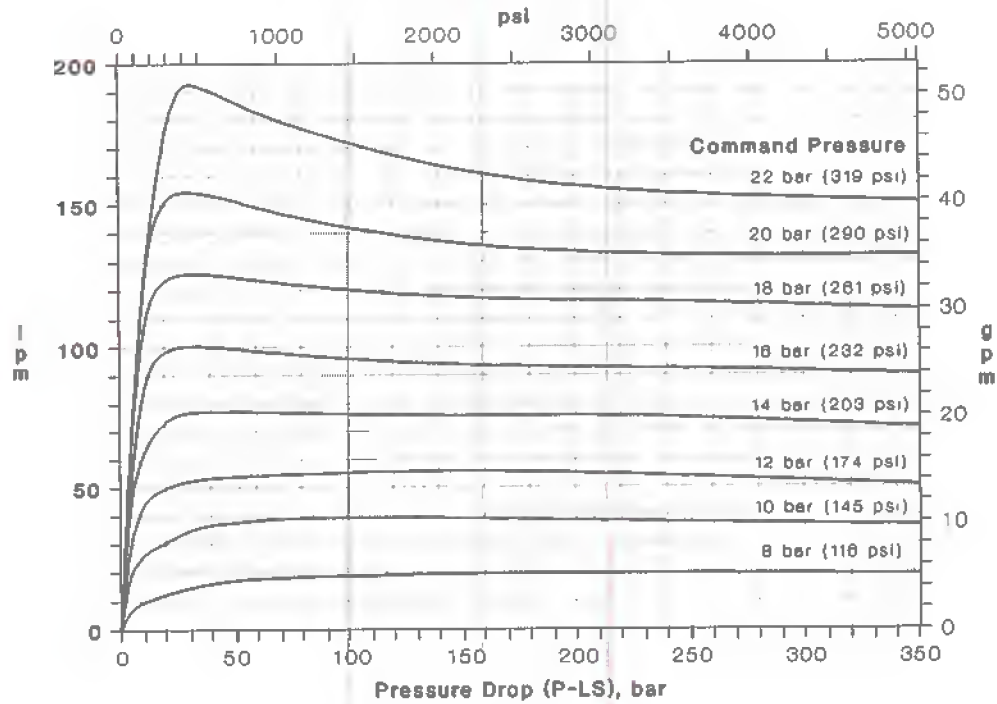


Figure 12a

**CMX100 METER-IN PRESSURE COMPENSATION
MODEL "S012" METER-IN ELEMENT**

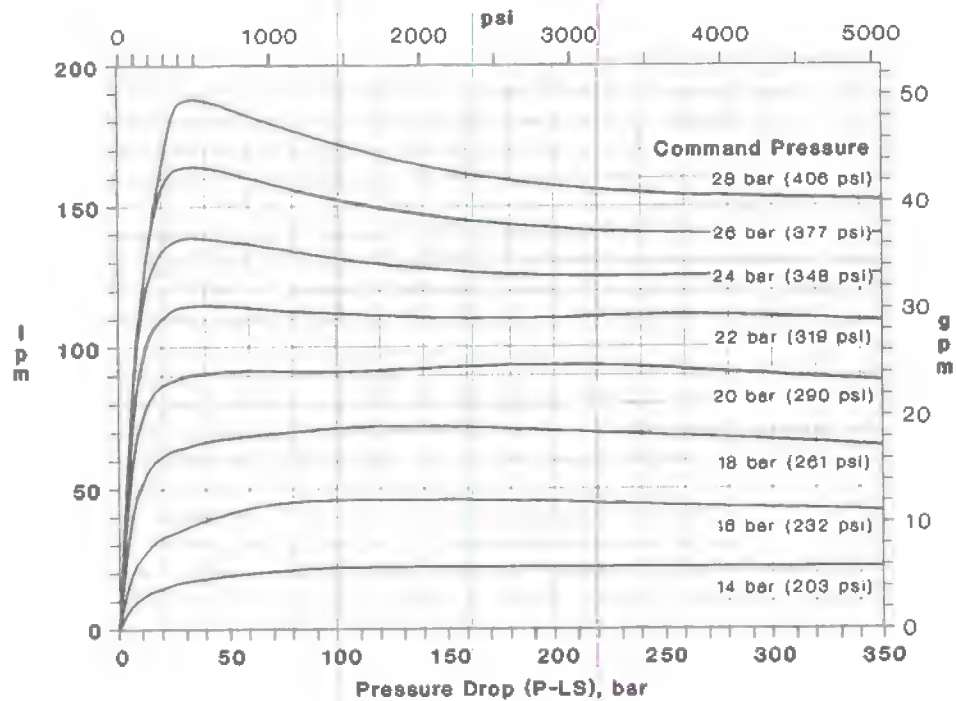


Figure 12b

CMX100 LOW FLOW M-I PRESS. COMPENSATION
MODEL "L006" METER-IN ELEMENT

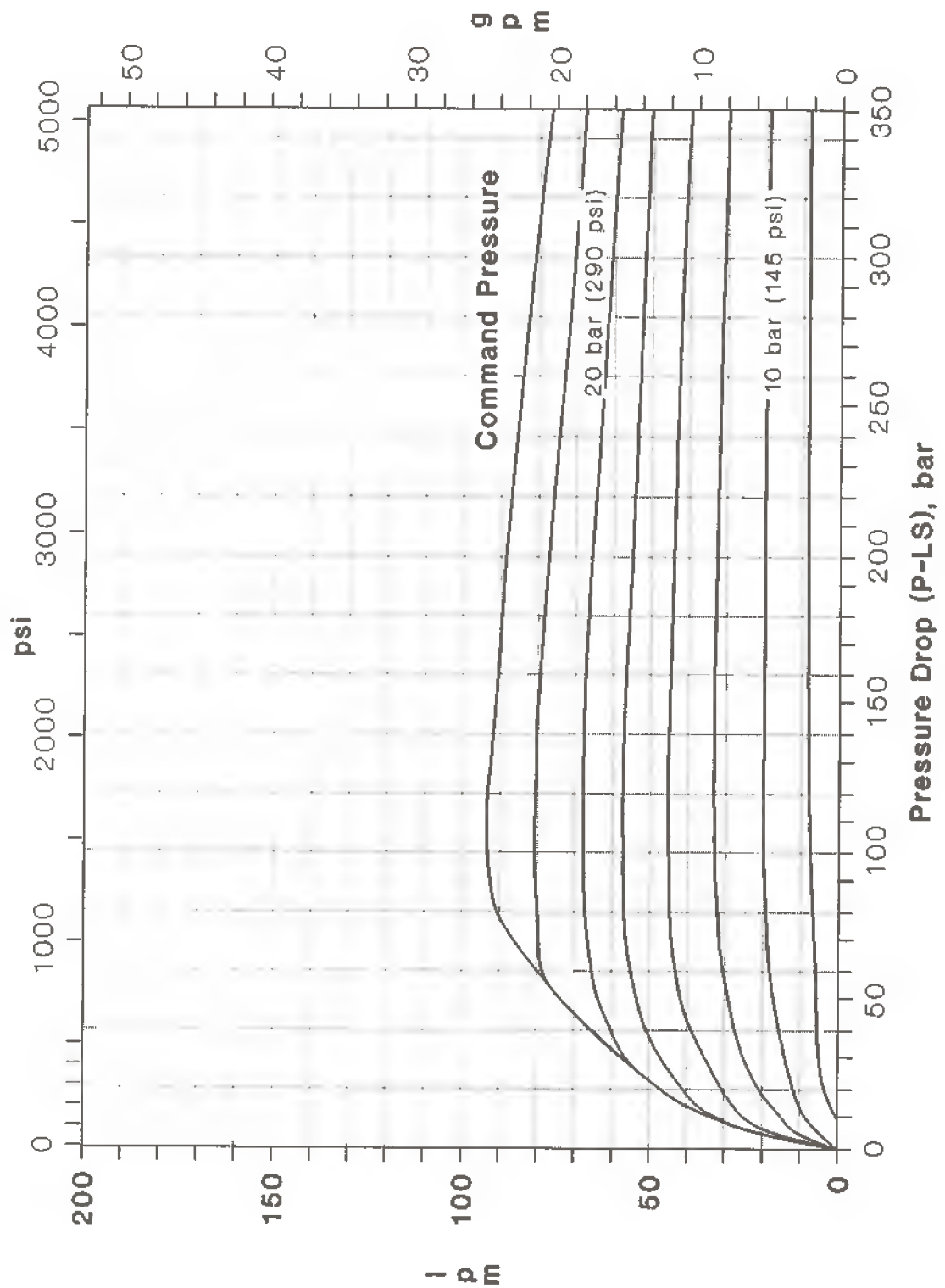


Figure 12c

**CMX160 METER-IN PRESSURE COMPENSATION
(FLOW FORCE COMPENSATION)
MODEL "S006" METER-IN ELEMENT**

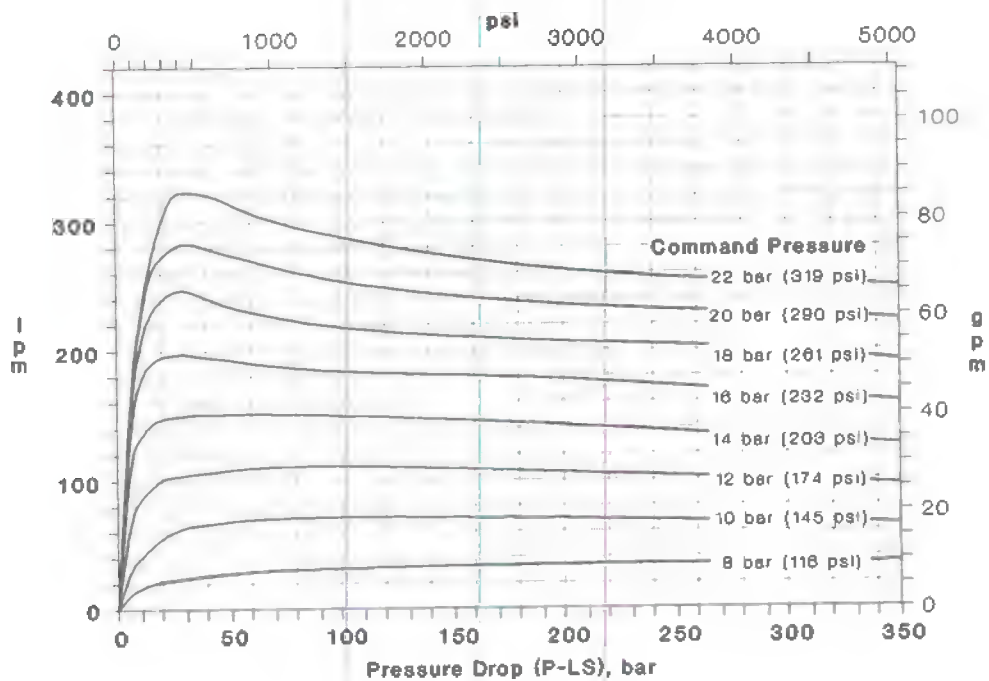


Figure 13a

**CMX160 METER-IN PRESSURE COMPENSATION
(FLOW FORCE COMPENSATION)
MODEL "S012" METER-IN ELEMENT**

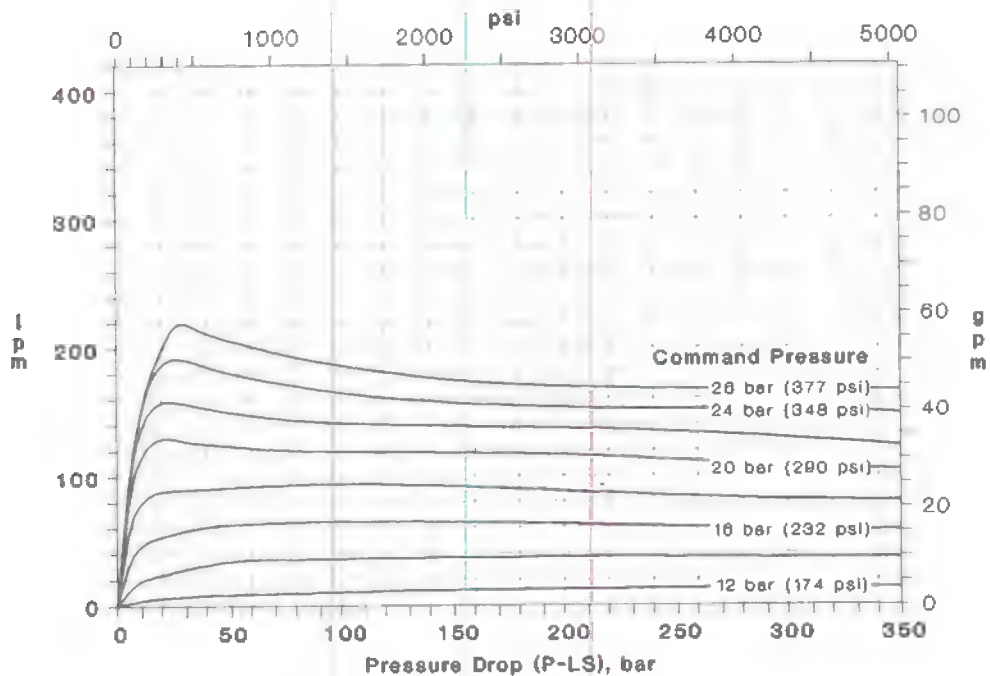


Figure 13b

Pressure control meter-in element "S***"

This element (Figure 14) is similar to the flow control element, except the pressure control spool has a feedback piston on each end. The meter-in chamber pressure acts on the area of the piston and opposes the pilot pressure opening the spool. The result is that, for a given input signal (pilot pressure), the flow decreases as the load pressure increases until the maximum pressure is reached at zero flow. By changing the input signal, the maximum load pressure can be changed.

For a constant load pressure, changing the input signal will change the velocity of the load. This feature provides the

operator with a good "feel" for the system by responding to changes in load pressure. For example, when driving a load at a given speed, if an obstacle is encountered, the load will slow or even stop. This response, which is typical of traditional open center bypass control valves, gives the operator better control of the system.

The pressure control spool also increases the system damping ratio, which affects system stability and response. By selecting the appropriate feedback piston size (diameter), the system damping ratio can be tailored to the application. Feedback piston diameters are given in the model code chart. The larger the feedback piston, the greater the increase in the damping ratio due to the pressure control spool.

The pressure-flow relationship is shown in the following Q-P diagrams (Figures 15 and 16). The slope of the constant-pilot-pressure lines is dependent on feedback piston diameter. The flow is independent of load pressure at zero load pressure, so a constant pilot pressure line will intercept the Q axis at the same point, regardless of its slope.

The meter-in chambers are drained by an orifice to the pilot pressure ports in a manner similar to the "S0***" flow control spool.

Different feedback piston sizes may be used for each end of the spool for different characteristics in each direction. A feedback pin may be used in one end only to provide pressure control in a single direction.

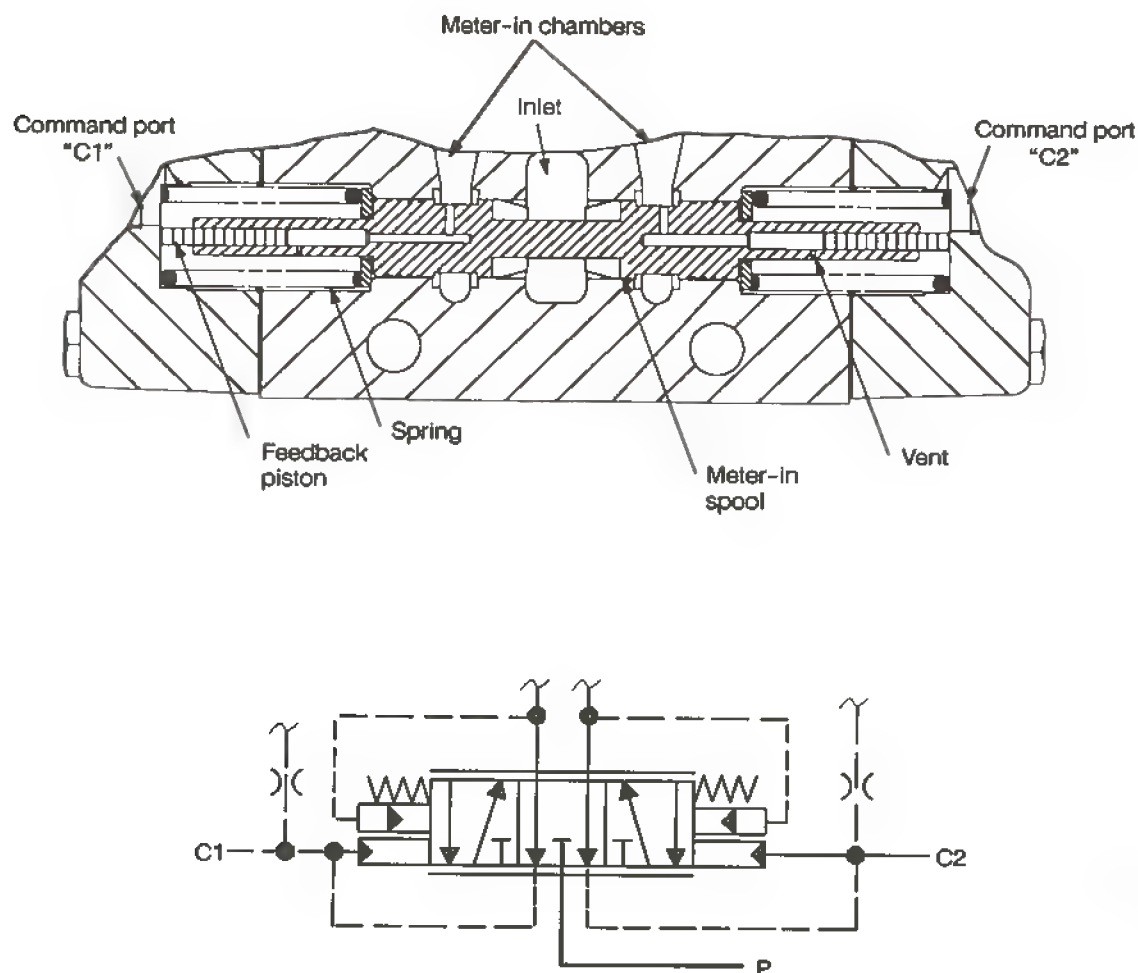


Figure 14

CMX100 METER-IN PRESSURE CONTROL SPOOL
 Pressure vs. Flow
 Model "S206" Meter-In Element

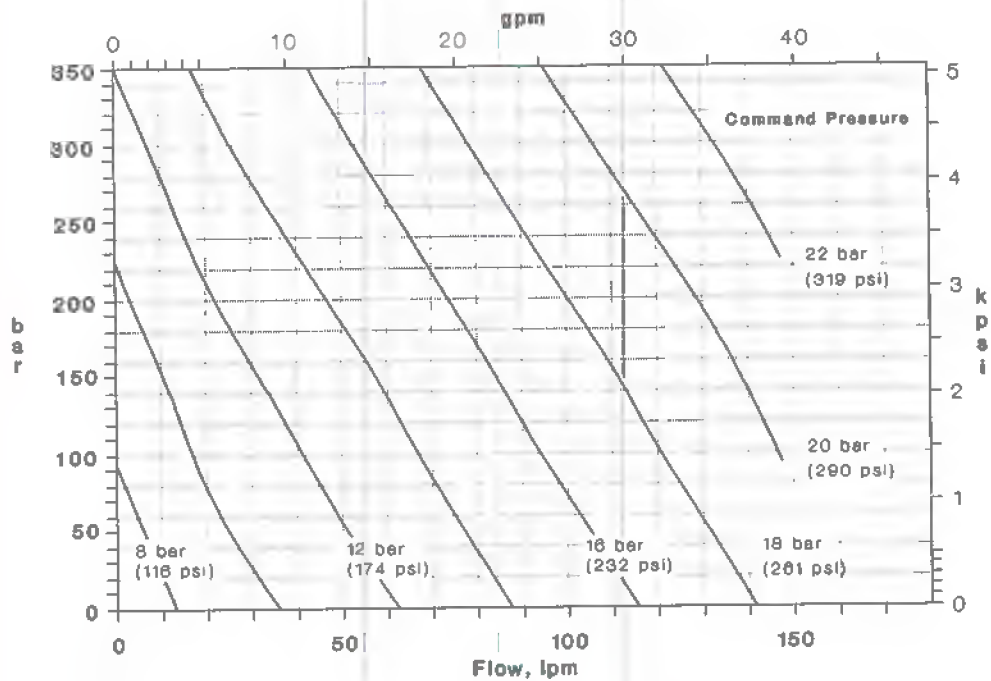


Figure 15a

CMX100 METER-IN PRESSURE CONTROL SPOOL
 Pressure vs. Flow
 Model "S406" Meter-In Element

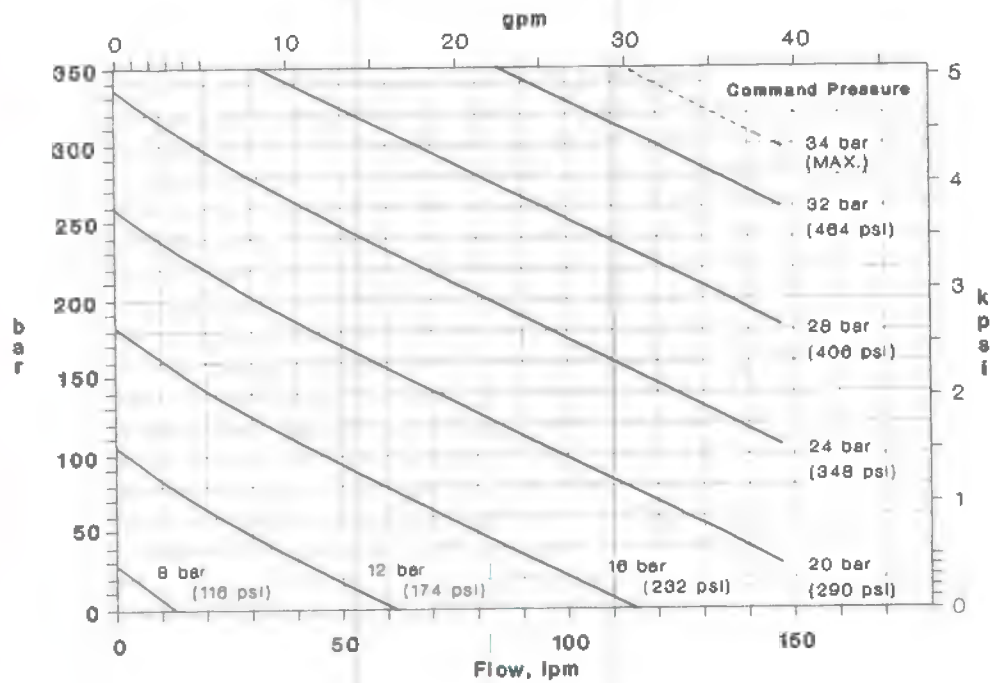


Figure 15b

CMX160 METER-IN PRESSURE CONTROL SPOOL

Pressure vs. Flow

Model "S206" Meter-in Element

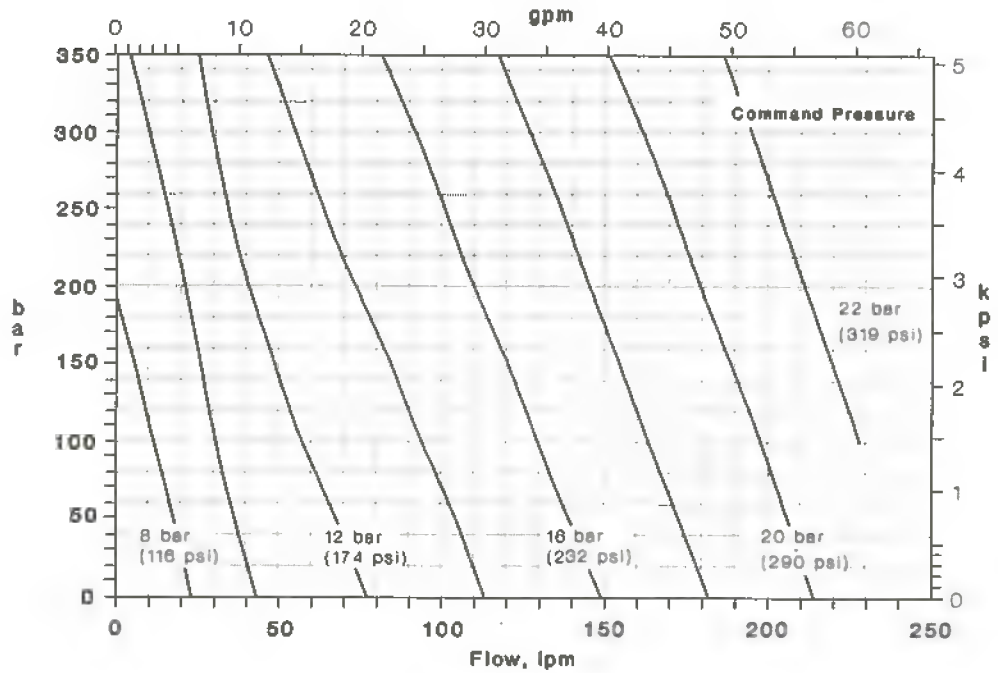


Figure 16a

CMX160 METER-IN PRESSURE CONTROL SPOOL

Pressure vs. Flow

Model "S406" Meter-in Element

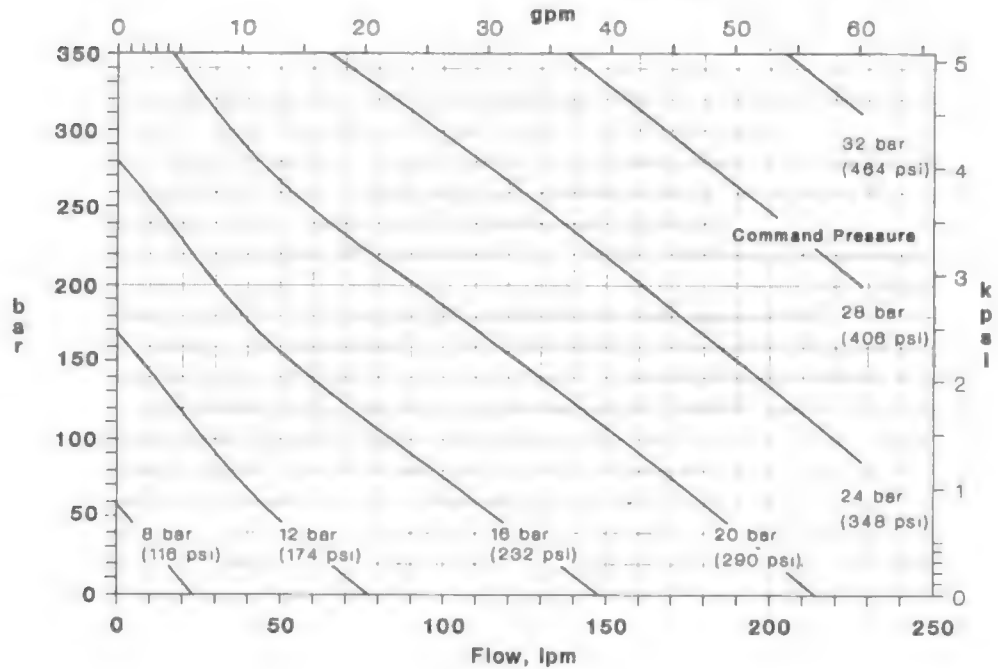


Figure 16b

CMX180 METER-IN PRESSURE CONTROL ELEMENT

Pressure vs. Flow
Model "S506" Meter-In Element

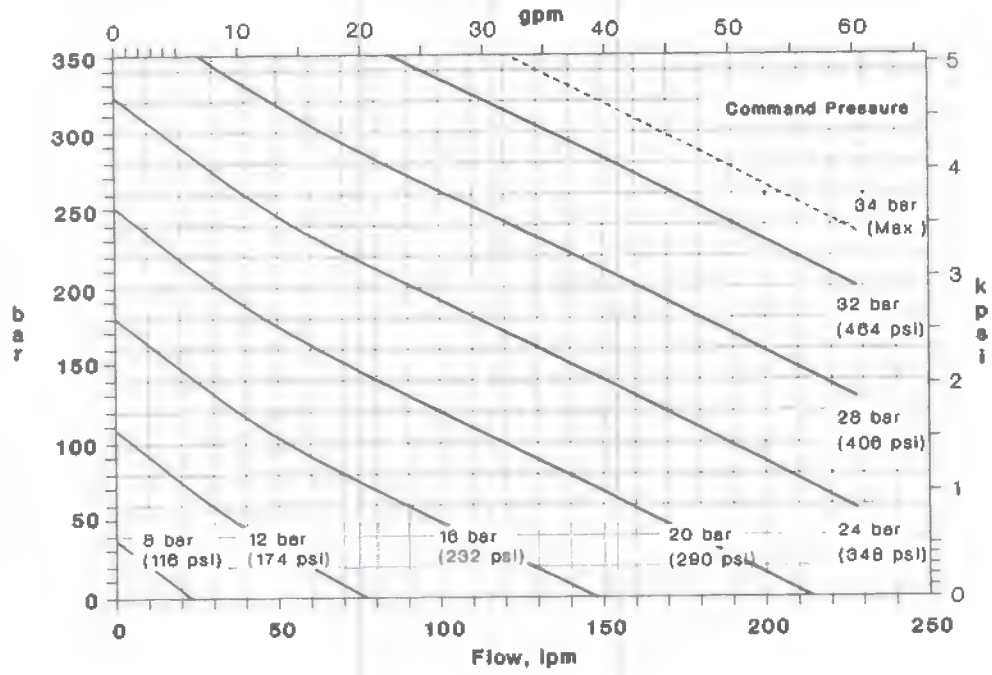


Figure 16c

"S***" spool pressure compensation

The pressure control spool is pressure compensated by flow forces to provide

constant flow independent of supply pressure, to minimize function interference. Since the spool does respond to load pressure and the pressure compensation curve is not

perfectly flat, changes in load pressure will cause slight changes in the pressure flow relationship, as shown below (Figure 17).

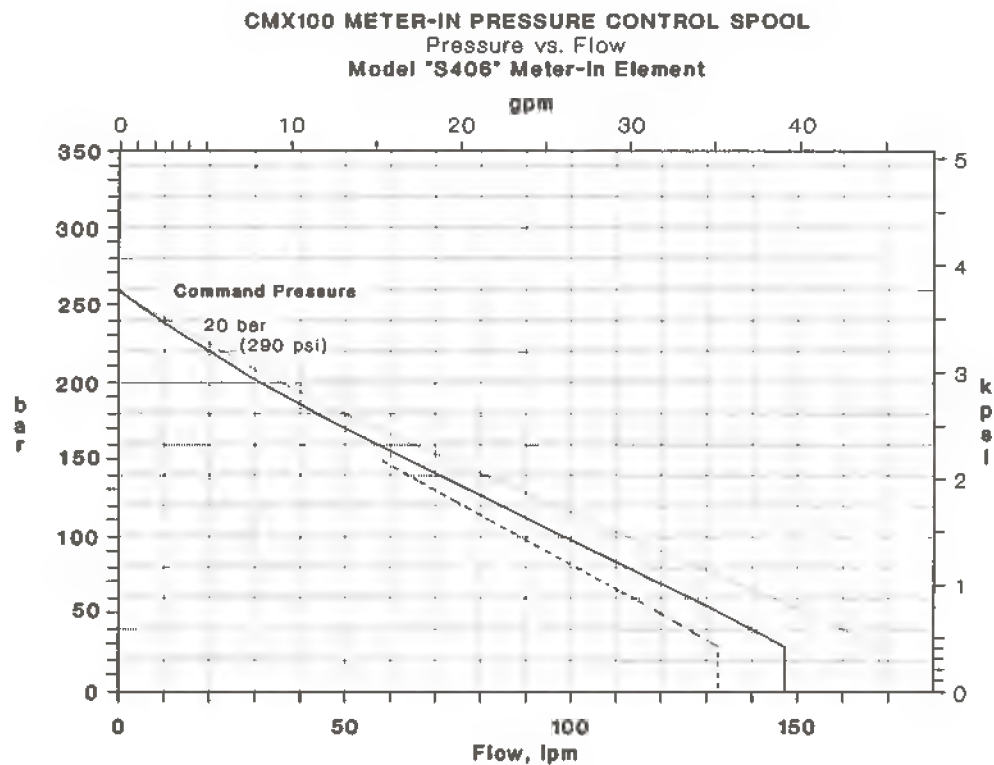
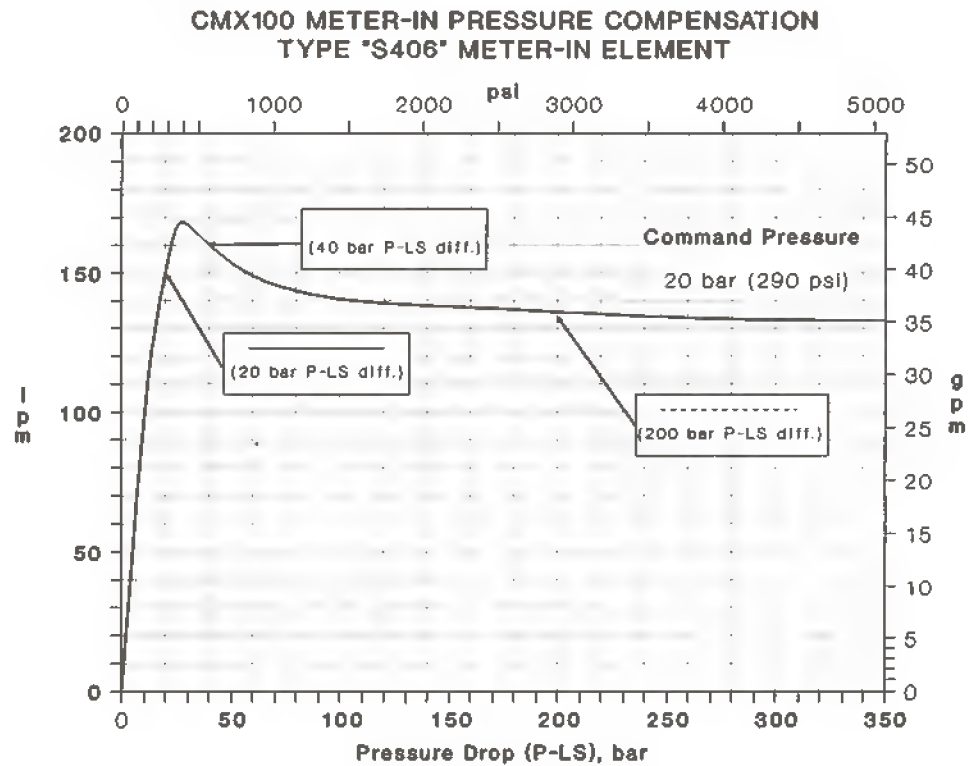


Figure 17

Flow limitation orifice

Flow to a work function can be limited by the installation of a restricting orifice in the pump supply port of the valve section. Since the orifice will restrict flow to all sections downstream, its use is normally limited to the last valve in a bank. The orifice is only effective if the limited flow function is the highest pressure function for the pump. The orifice reduces the pressure drop across the meter-in element, while the pump maintains a constant pressure differential between pressure and load sensing.

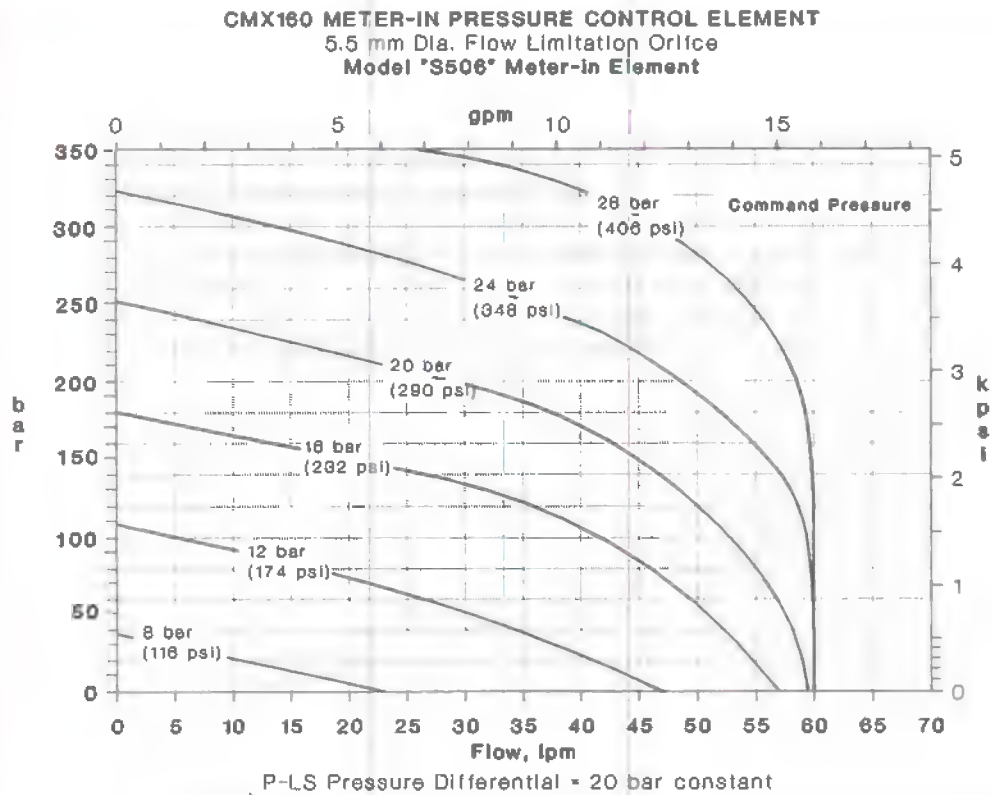


Figure 18a

**METER-IN FLOW LIMITATION
ORIFICE SELECTION CHART
Maximum Flow vs. Inlet Orifice Dia.**

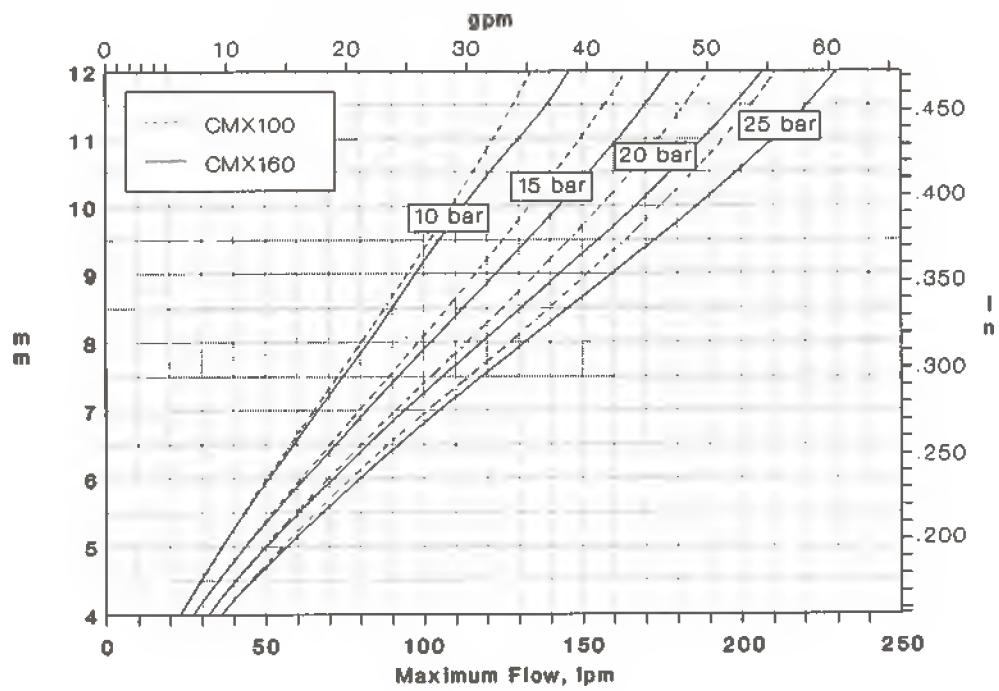


Figure 18b

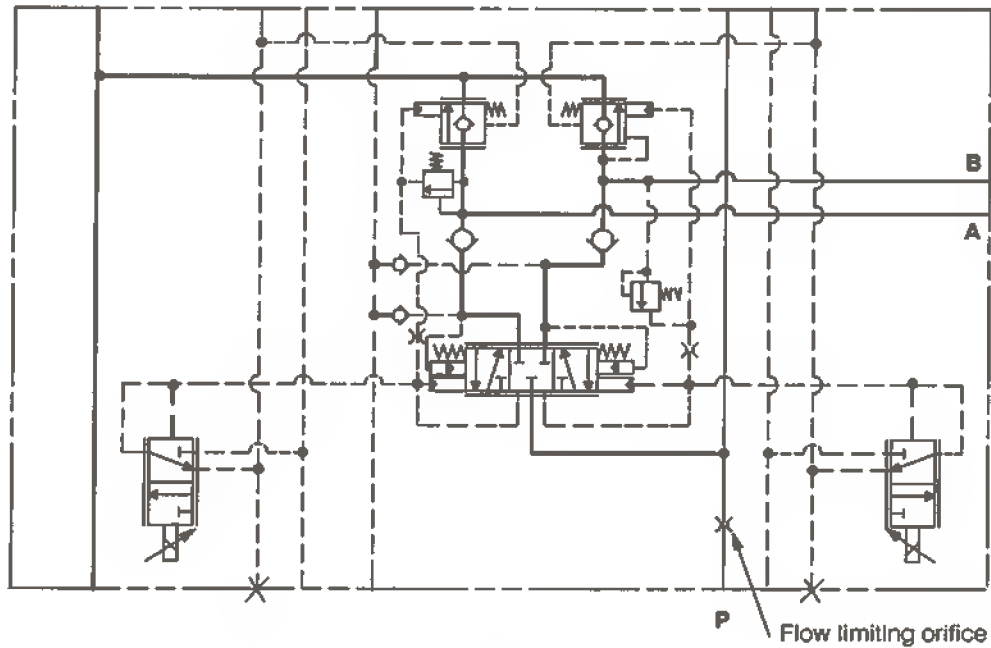


Figure 18c

Load sensing check valves – standard design

The -24 design CMX sectional valves are equipped with load sense check valves (Figure 19), that are different from the load sense shuttle valves provided on earlier models. The function of the load sense check valves is to supply the highest active load pressure to the load sense passage, while isolating lower pressure meter-in chambers from the load sense

passage. The load drop check valves prevent the load pressure from overrunning loads or inactive (neutral) sections from reaching the meter-in chambers. When one or more of the sections in a valve bank is energized, the highest meter-in pressure is presented to the load sense port, which in turn controls the pump output pressure.

The load sensing pumps supplied by Vickers normally produce an output pressure between 13.8 bar (200 psi)

and 41.4 bar (600 psi) above the load sense pressure. When all the sections are centered (or whenever the meter-in load sense signal decreases), all the load sense check valves close, trapping fluid in the load sense passage. A provision to vent this trapped fluid must be provided to allow the load sense signal to decay and the pump output pressure to return to standby. Valve bank end covers are available with a provision to vent the load sense port to drain.

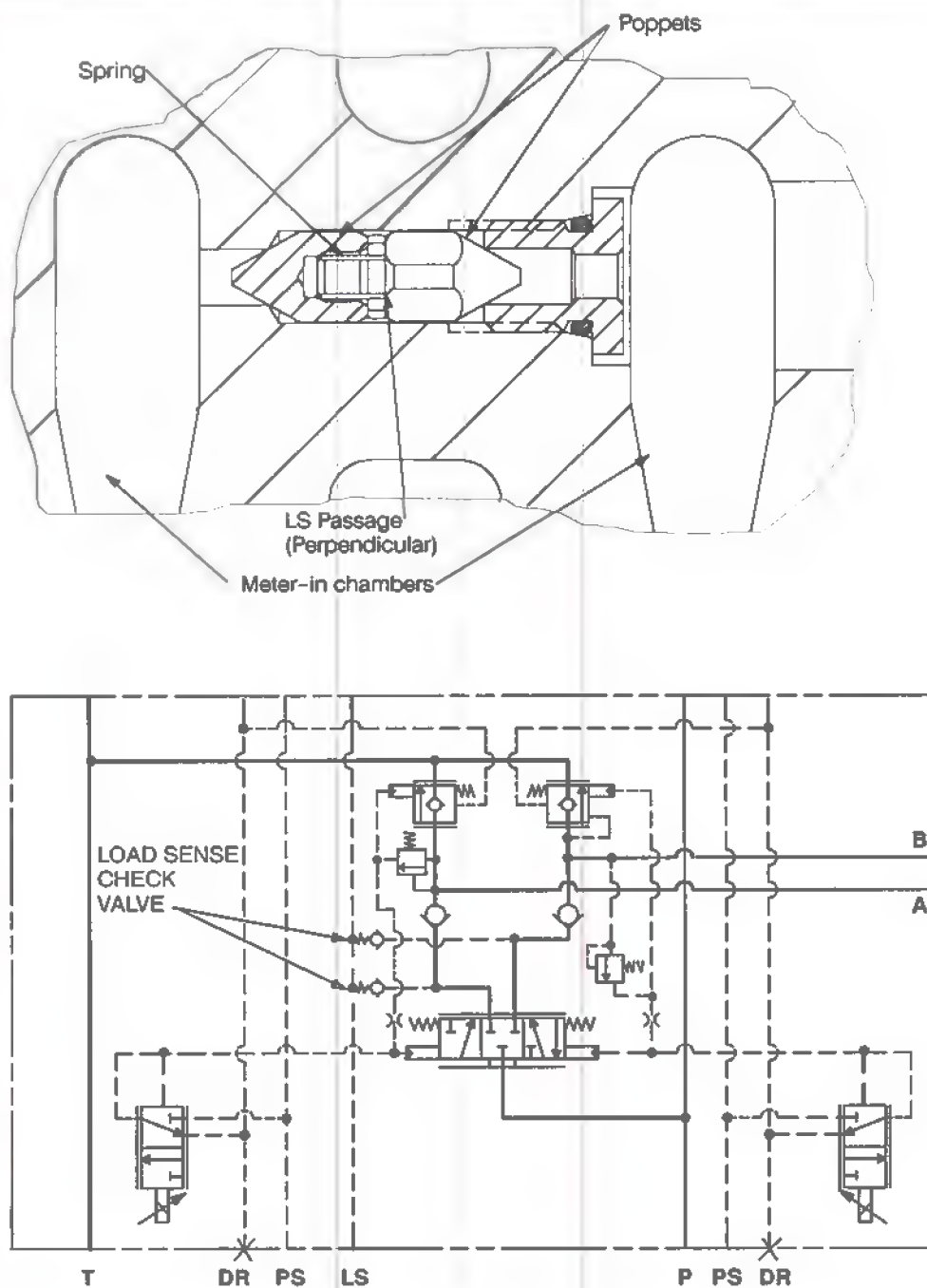


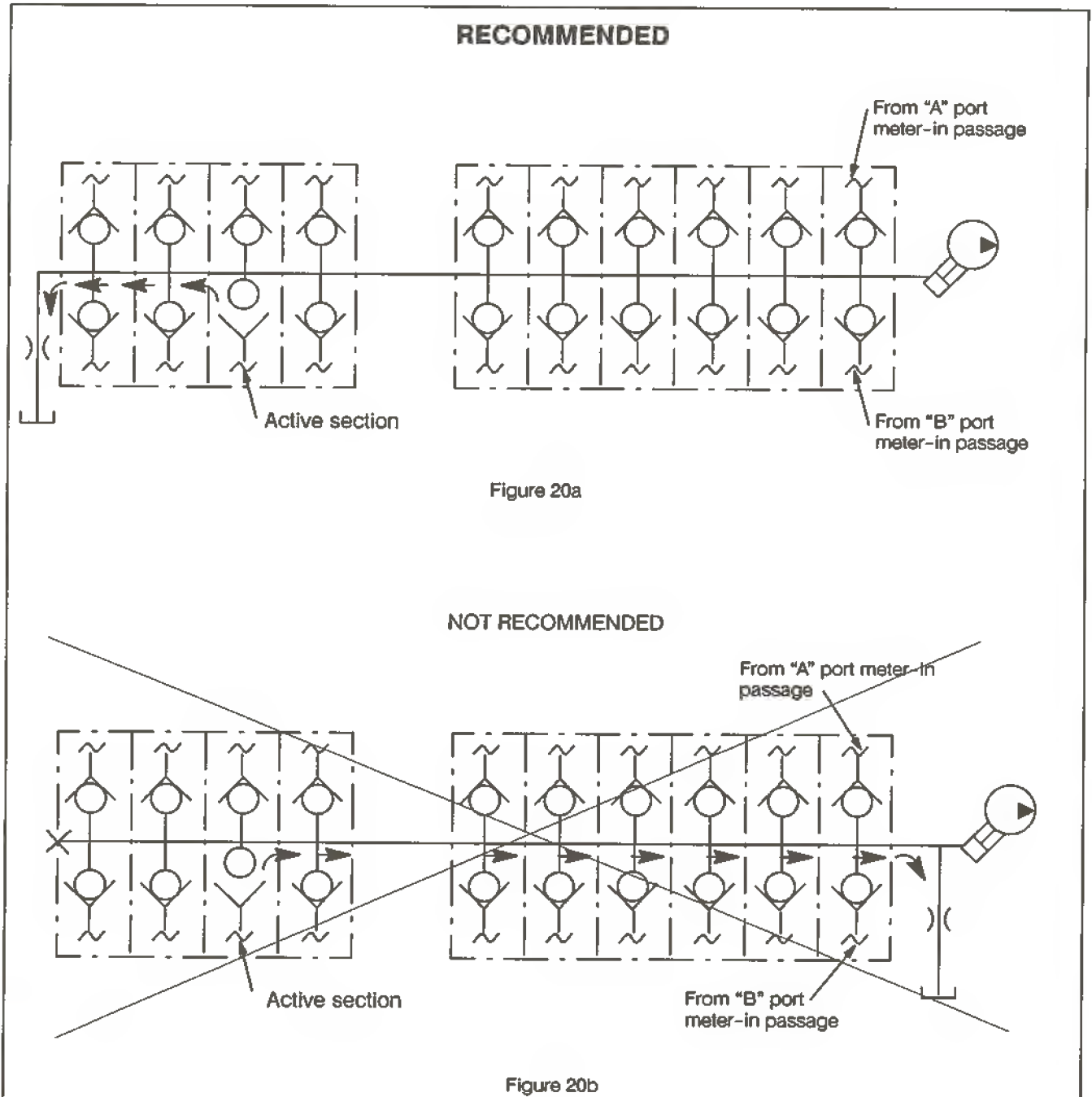
Figure 19

On systems which utilize the 0.5 mm bleed orifice, it is recommended for optimum performance that the orifice be located at the end of the valve bank opposite the pump connection. On multiple valve bank systems, the load sense connections should be made in series, with the orifice located as far from the pump as possible. On mid-inlet valve banks, the load sense-to-pump connection should be made at one end cover, and the bleed orifice located at the opposite end cover. The reasons for the above recommendations are as follows:

Flow in the load sense passage to the load sense bleed orifice causes a

pressure drop through each section. The cumulative effect of the pressure drop through each section can be significant, especially at higher load sense pressures, higher fluid viscosities, and when many sections are present. The higher load sense pressures cause a higher bleed flow rate, and higher fluid viscosities (such as cold oil) cause a higher pressure drop. If the bleed flow is toward the pump load sense port (Figure 20b), the pressure drop subtracts from the load sense signal. For example, assume a 200 bar (2900 psi) load, and a pump load sense setting of 13.8 bar (200 psi). When the valve is energized, the 200 bar is presented to the load sense

passage. If flow to the bleed orifice causes a pressure loss of 0.7 bar (10 psi) per section, and there are eight sections between the valve and the pump, then the pump will sense a load sense signal of $194.4 \text{ bar (2820 psi)}$, and maintain an output pressure of $194.4 + 13.8 = 208.2 \text{ bar}$, which is only 8.2 bar (119 psi) above the load pressure. The result will be slower operation for that function. If the bleed flow is away from the pump load sense (Figure 20a), then the actual load sense pressure is supplied to the pump without flow induced pressure losses, and consistent performance can be achieved.



Load drop check valves – standard

The load drop check valves (Figure 21) isolate the meter-in spool and the load sense check valves from the actuator ports. This feature makes it possible to maintain very low cylinder port leakage independent of meter-in spool-to-bore clearance. Therefore, meter-in spool-to-bore clearances are relatively large, minimizing hysteresis and making meter-in spools fully interchangeable.

Bleed orifice

Certain applications, such as brake release circuits and counterbalance circuits, require low actuator port pressure to be maintained in neutral. Load drop check valves with a bleed orifice are available to vent fluid trapped in the actuator ports to the meter-in chambers. This feature requires a meter-in element with drain orifices.

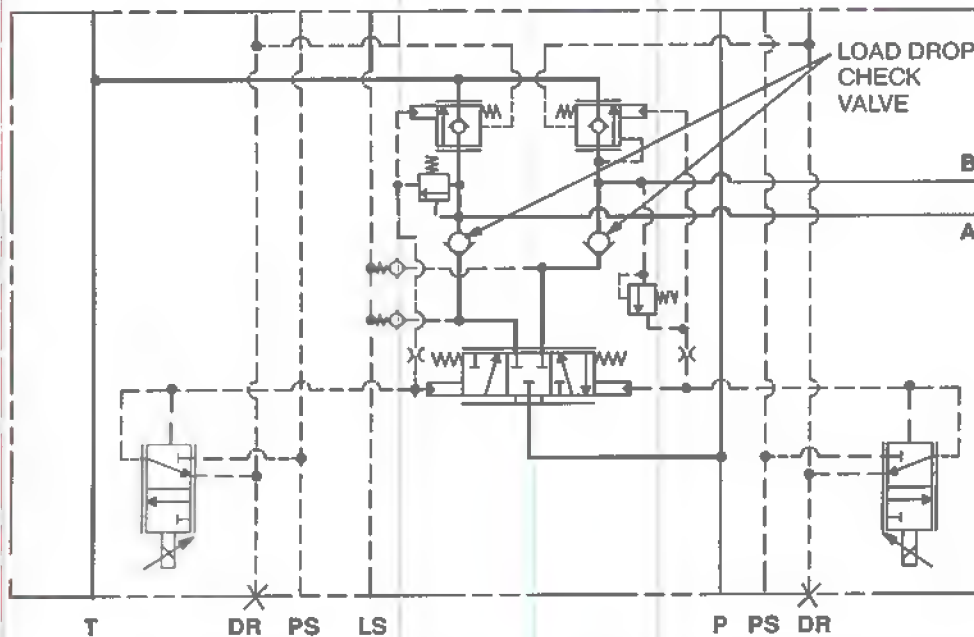
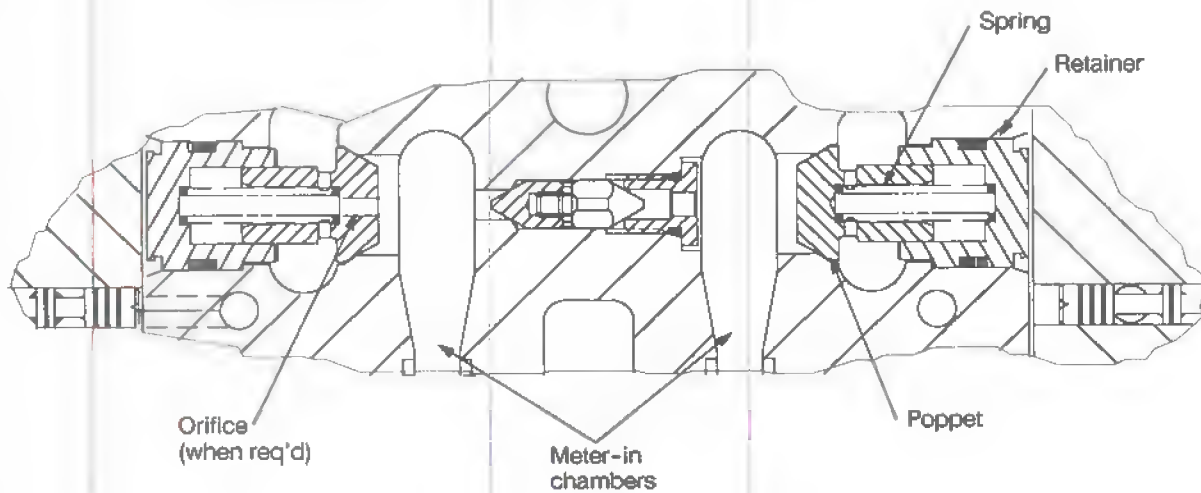


Figure 21

**CMX SECTIONAL VALVE
LOAD DROP CHECK
FLOW vs. PRESSURE DROP**

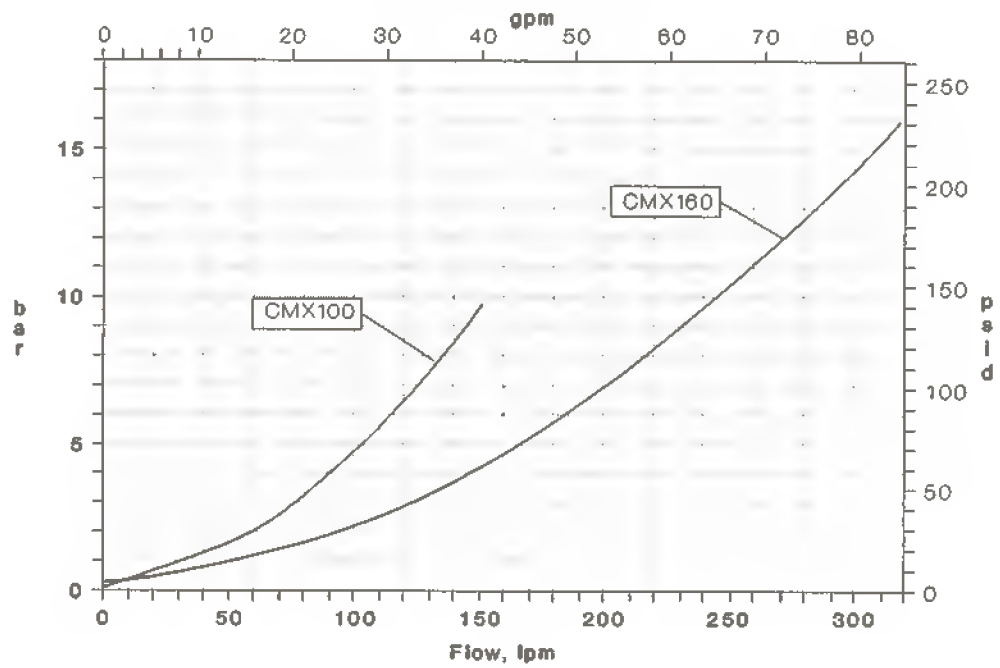


Figure 22

Meter-out elements

Meter-out control is achieved by using a pilot poppet-stem along with a modulating meter-out poppet to form a simple hydromechanical bleed servo (Figure 23). Actuator port pressure acts on the annular differential area between the major outside diameter of the meter-out poppet and the meter-out poppet skirt (or seat) diameter, and tends to push the meter-out poppet open. The pressure in the spring chamber acts on the full major O.D. area of the meter-out poppet, and tends to close the meter-out poppet. When the meter-out element is closed, the pressure in the spring chamber is equalized to actuator port pressure via

a 0.75 mm (.030 in.) orifice in the meter-out poppet. Since the pressure in the spring chamber is only partially offset by the actuator port pressure acting on the annular area, the meter-out poppet remains closed provided tank pressure is below actuator port pressure.

To open the meter-out poppet, pilot pressure applied to the meter-in spring chamber is transmitted by a passage in the control cap gasket to the meter-out piston. The force against the meter-out piston moves the poppet-stem from its seat and against the opposing spring, opening a passage from the meter-out spring chamber to the tank passage. Fluid then passes from the actuator port

through the orifice in the meter-out poppet to the spring chamber and then to tank. This flow develops a pressure differential across the orifice in the meter-out poppet, which subtracts from the actuator port pressure, reducing the meter-out spring chamber pressure. When the pressure in the meter-out spring chamber falls low enough, the actuator port pressure acting on the annular area will overcome the meter-out spring chamber pressure and open the meter-out poppet, moving it toward the poppet stem. This motion will tend to close the poppet-stem against its seat, reducing the flow-induced pressure drop across the orifice and increasing the pressure in the meter-out spring chamber.

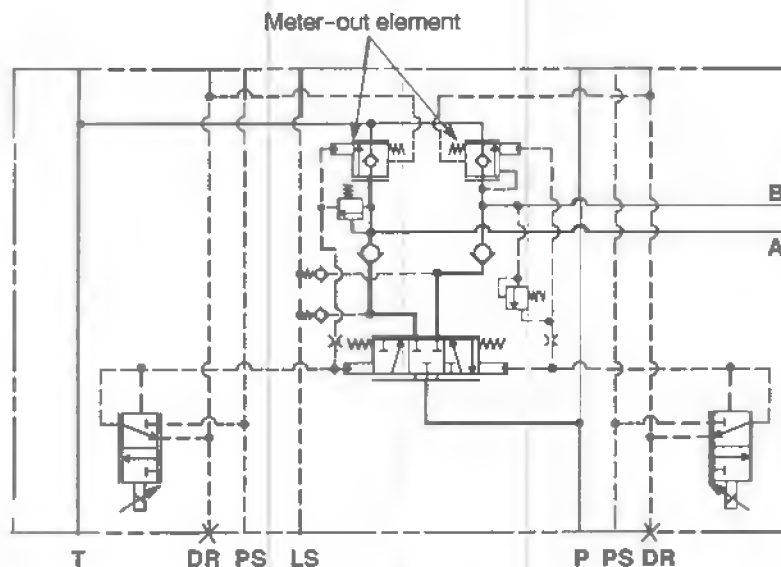
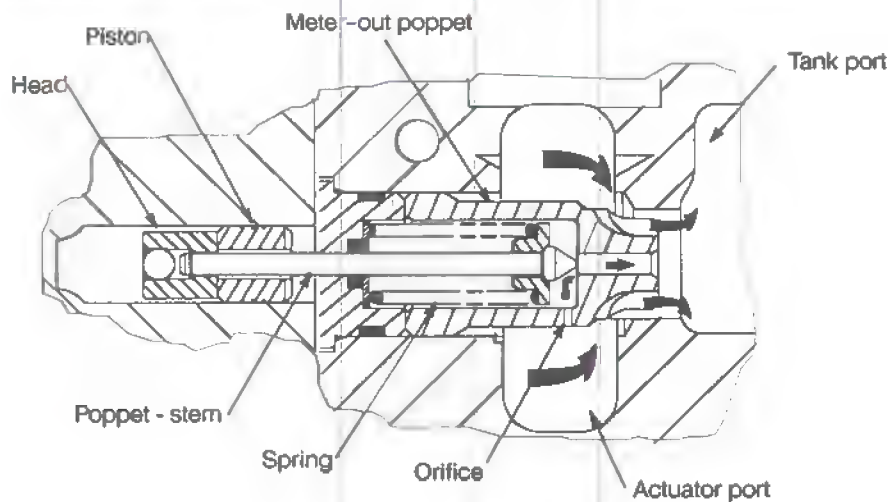


Figure 23. The meter-out element is not pressure compensated, so interaction problems with the meter-in element are avoided.

The meter-out poppet will assume a position where the poppet stem to-seat restriction is such that the reduced pressure in the meter-out spring chamber balances the forces on the meter-out poppet. The net effect is that the meter-out poppet follows the poppet-stem position. The movement of the poppet-stem is controlled only by the pilot signal and the spring it moves against. The position feedback gain of the meter-out poppet is high, so a small change in position of the meter-out poppet away from the balanced-force position results in a large increase in forces acting to return the meter-out poppet to the balanced-force position. These forces are high compared to flow forces, so the meter-out poppet will not close prematurely due to flow forces.

Several different meter-out poppets are available which provide different area gains. A high gain poppet (low ΔP at rated flow) provides better control when lowering a light load. A low gain poppet (high ΔP at rated flow) provides better control when lowering heavy loads.

Meter-out poppets are rated according to the actuator port to tank pressure drop in bar across the poppet at the valve's rated flow with the poppet fully opened. Performance data is given in Figures 24 and 25.

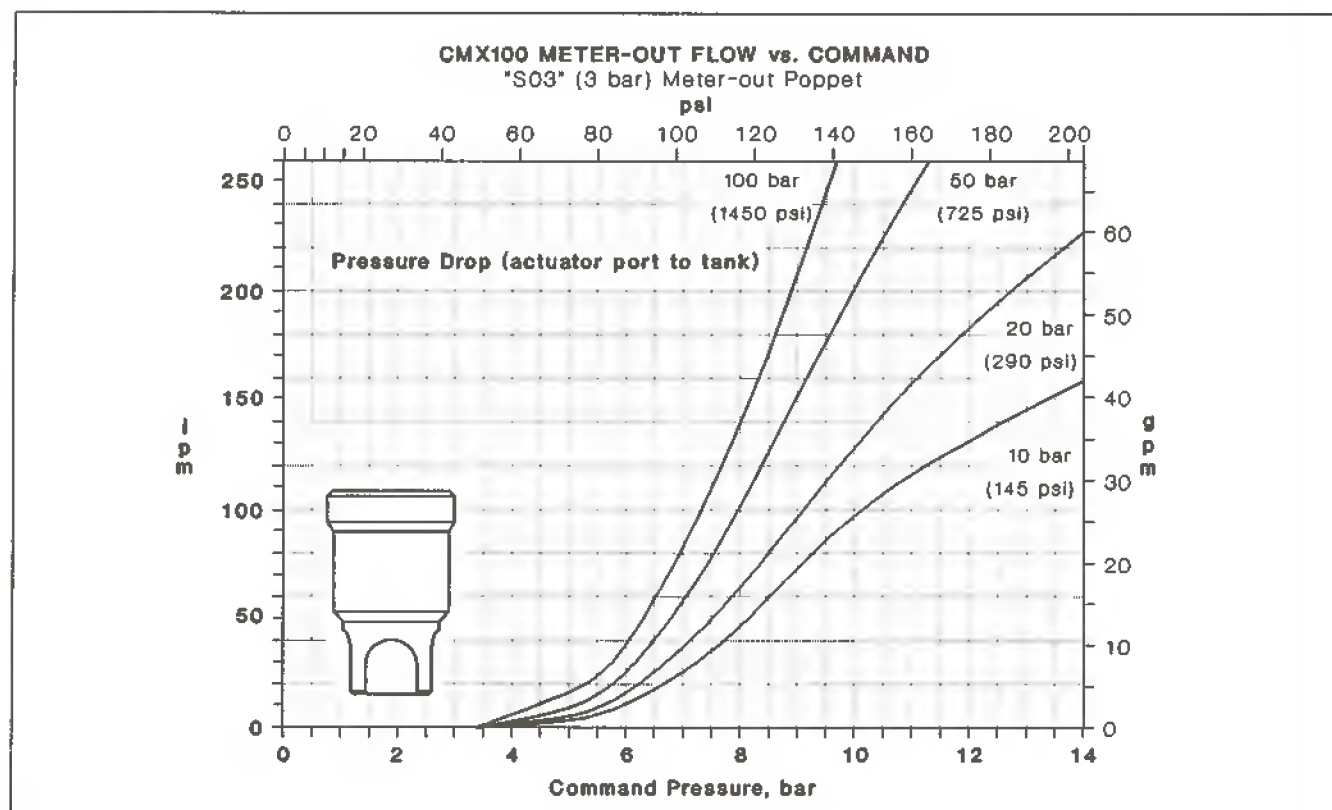


Figure 24a

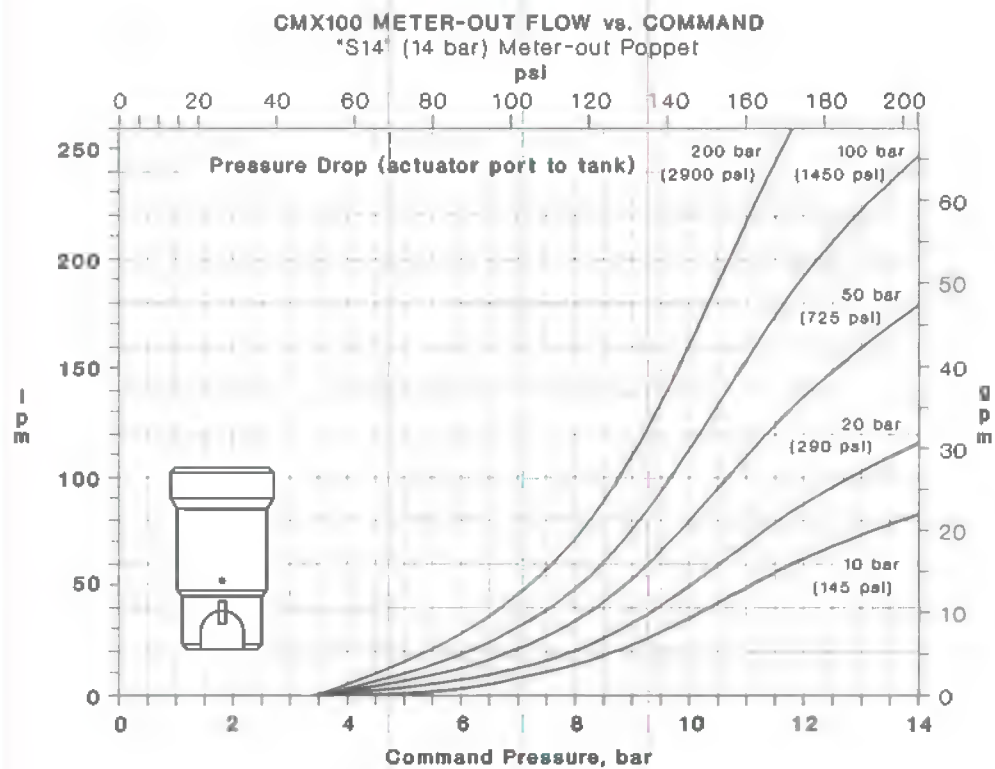


Figure 24b

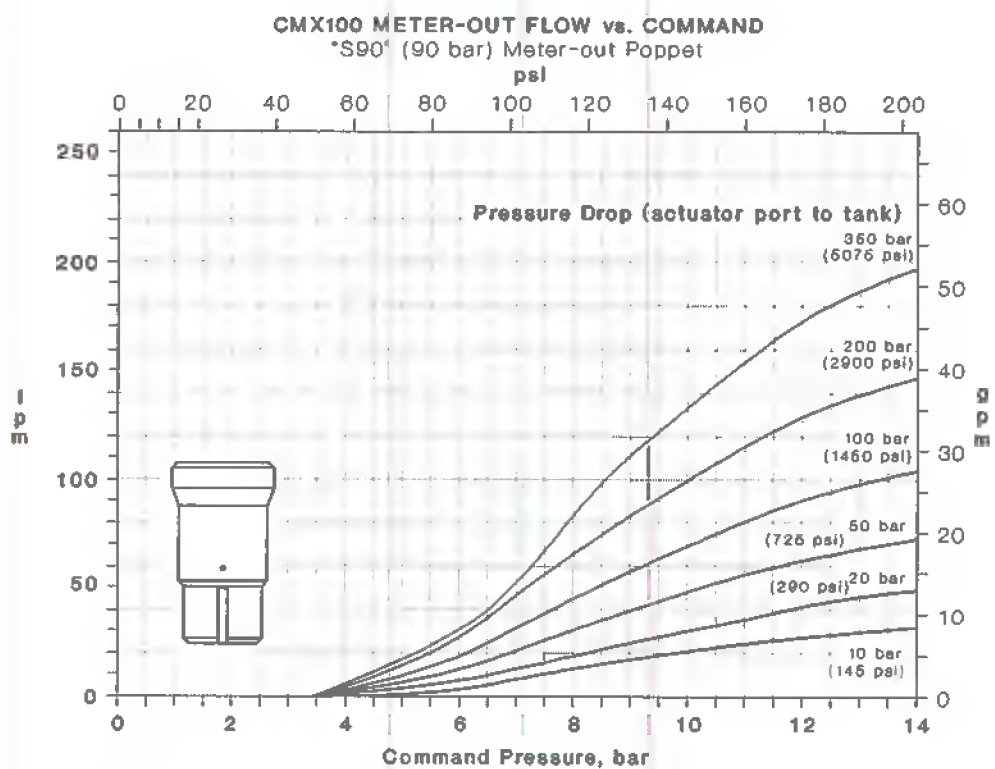


Figure 24c

CMX160 METER-OUT FLOW vs. COMMAND
 "S04" (4 bar) Meter-out Poppet

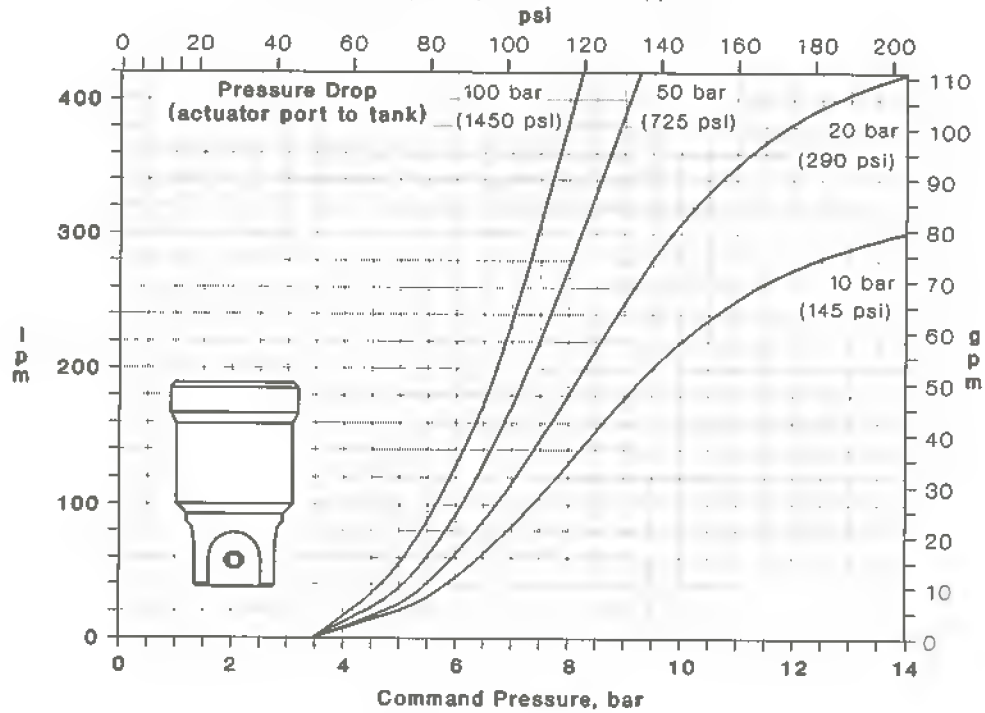


Figure 25a

CMX160 METER-OUT FLOW vs. COMMAND
 "S07" (7 bar) Meter-out Poppet

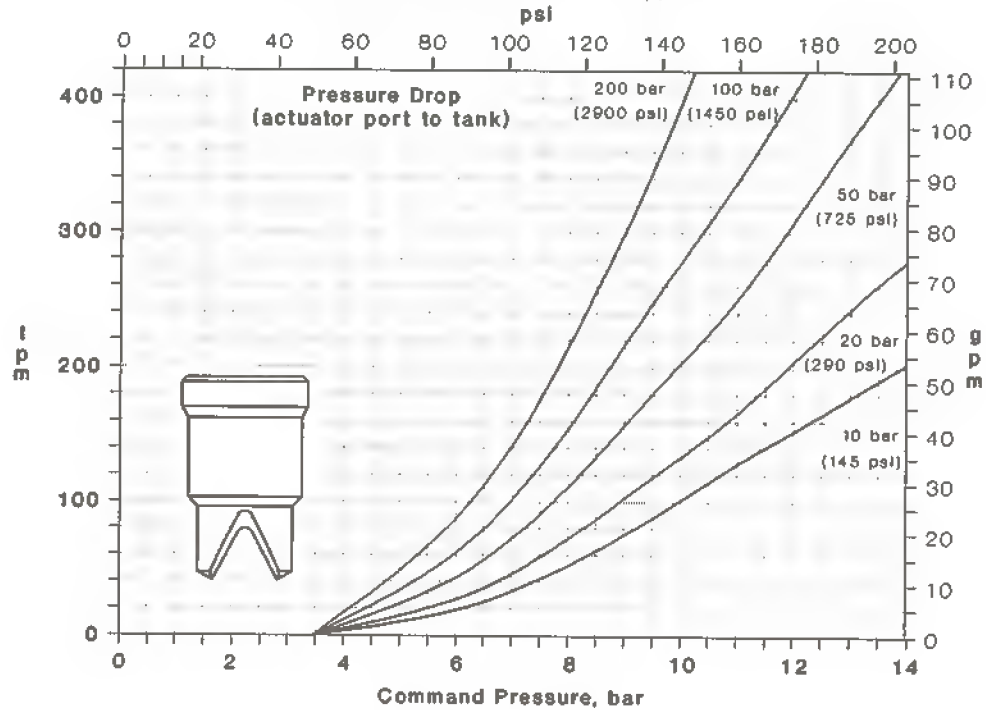


Figure 25b

CMX160 METER-OUT FLOW vs. COMMAND

"S14" (14 bar) Meter-out Poppet

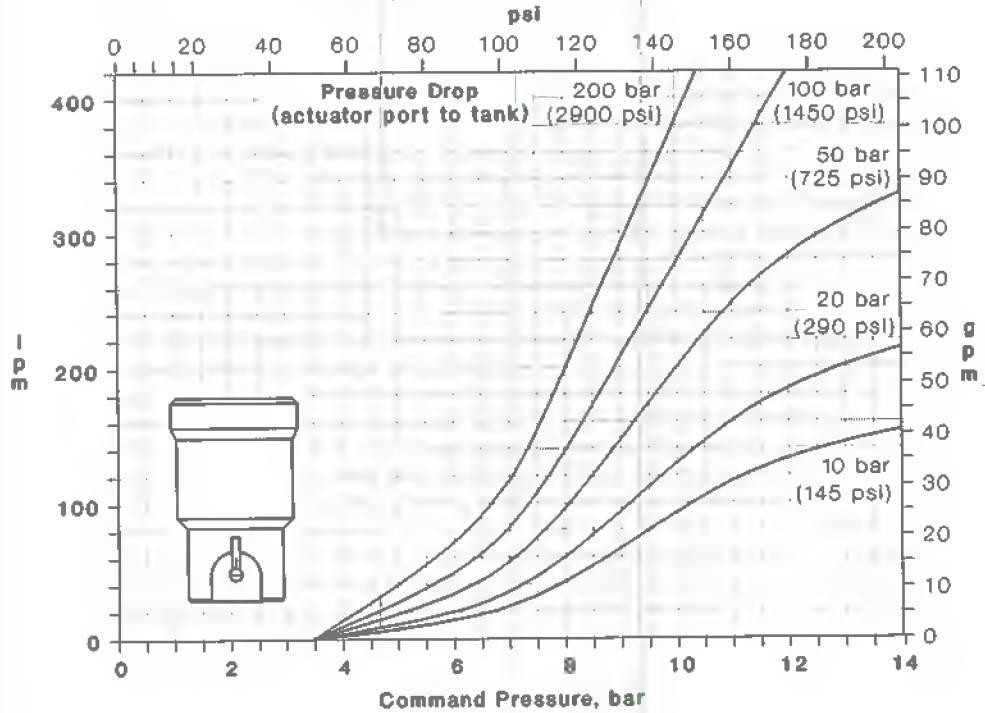


Figure 25c

CMX160 METER-OUT FLOW vs. COMMAND

"S56" (56 bar) Meter-out Poppet

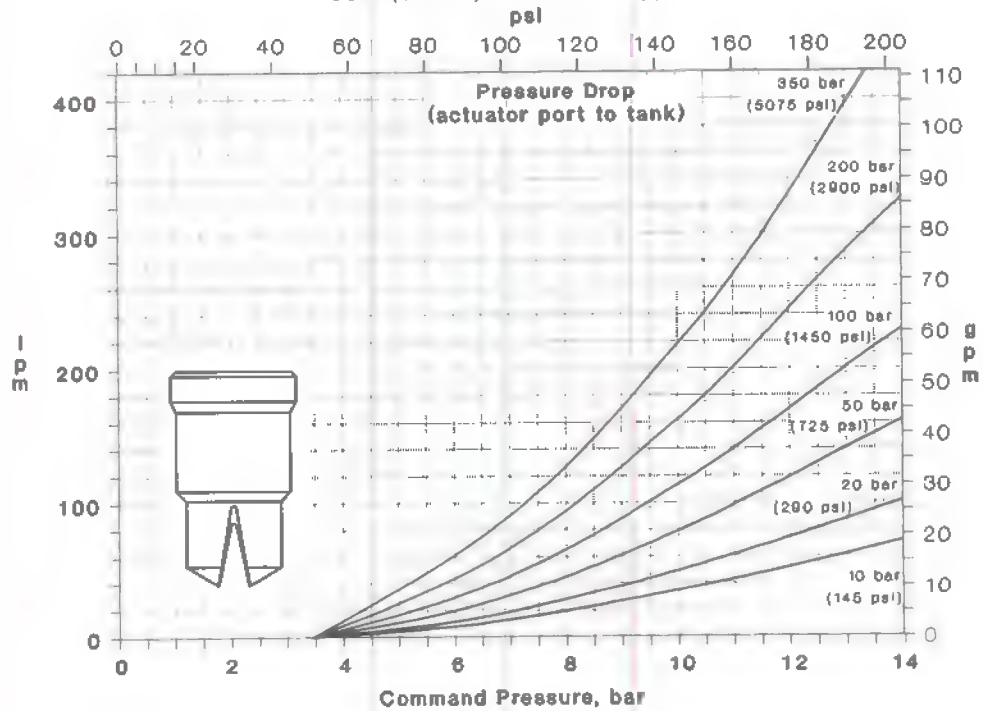


Figure 25d

Anticavitation check valves – standard

Cavitation protection is normally provided by reverse flow through the meter-out poppets. In this mode, tank pressure above the actuator port pressure, acting on the meter-out poppet skirt area, opens the meter-out poppet. Tank pressure is maintained by a back pressure check in the tank line. Performance (flow vs. pressure drop) is shown on the diagrams below (Figure 26).

For meter-out load pressures above 70 bar sufficient momentum exchange occurs, due to the high velocity jet from an actuator port exhausting fluid impinging upon the opposite meter-out poppet, to cause the opposite actuator port pressure to be higher than the tank pressure. This phenomenon is fairly complex, since the opposite port pressure is a function of the load pressure, load speed (or flow rate), the tank port pressure, the area gains of both meter-out poppets (poppet types) and the cylinder area ratio.

The following example is illustrative: for a CMX160 lowering A to T a load of 138 bar (2000 psi), 160 lpm (42 USgpm), 1:1 area ratio, open tank (no back pressure check valve), a type "56" meter-out poppet in the A port, and a type "07" poppet in the "B" port; the "B" port pressure is 12.9 bar (187 psi) and the tank port pressure is 0.5 bar (7 psi). For the same conditions with a 2:1 area ratio, the "B" port pressure would be 7.6 bar (110 psi) and the tank pressure would be 0.7 bar (10 psi).

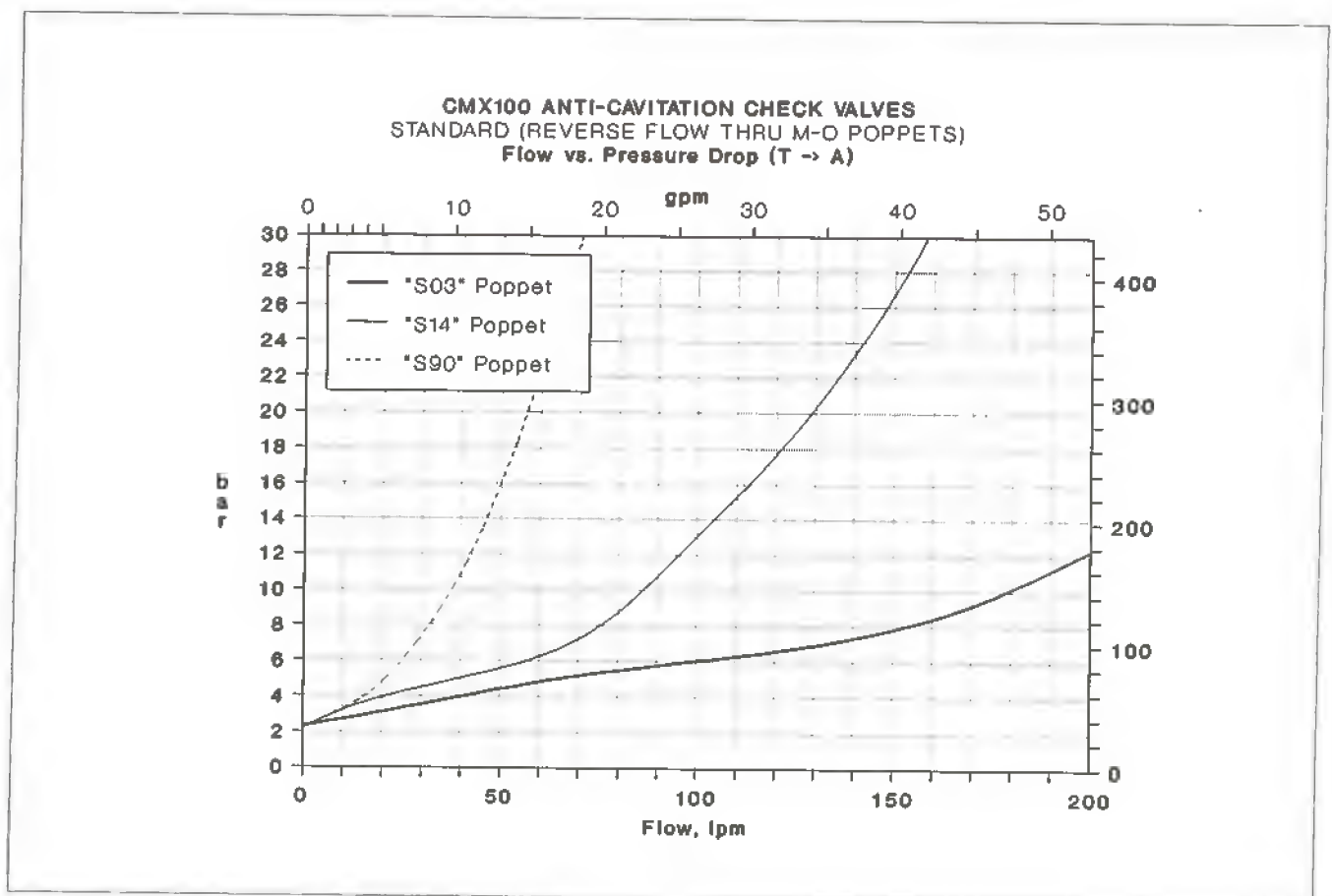


Figure 26a

CMX160 ANTICAVITATION CHECK VALVES
STANDARD (REVERSE FLOW THRU M-O POPPETS)
Flow vs. Pressure Drop (T → A)

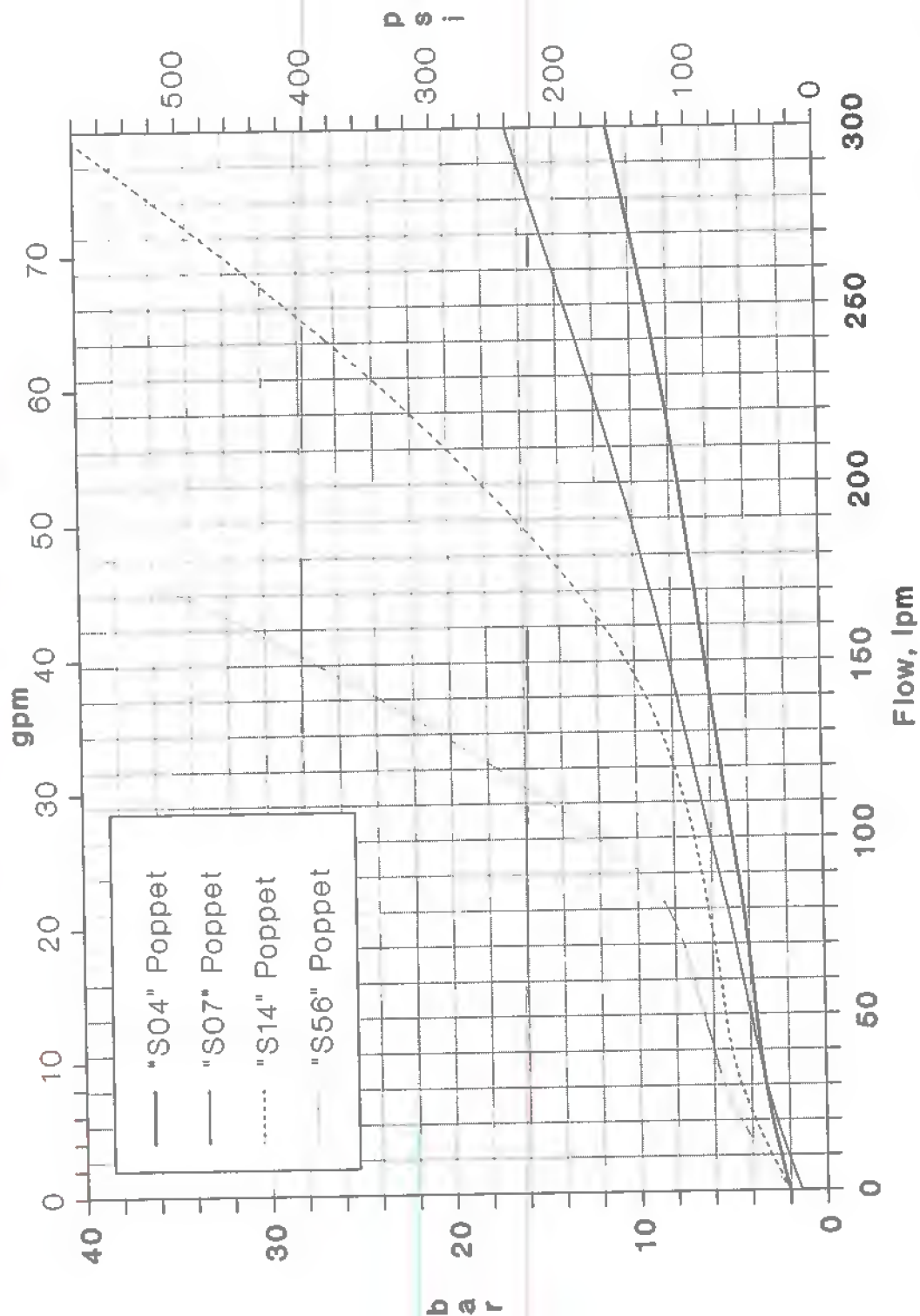


Figure 26b

The meter-out poppet will remain closed when the tank pressure is above the actuator port pressure and the meter-out servo is piloted open. In this case, the poppet-stem opens, and fluid enters the spring chamber from tank. The orifice in the meter-out poppet restricts the flow leaving the spring chamber, so the spring chamber pressure is nearly equal to the tank pressure. Since the actuator port pressure is lower than tank, the force on the annular area of the meter-out poppet due to actuator port pressure is less than the opposing force due to

tank pressure in the spring chamber, and the meter-out poppet closes and remains closed. Cavitation can occur under these conditions, which normally occur only if the "float" feature (page 36) is used, or when reversing the direction of a moving load. Special meter-out poppets are available with check valves which prevent reverse flow into the meter-out spring chamber and subsequent uncontrolled closing of the meter-out poppet. (Not available for CMX160 "07" and "56" M-O poppets.)

Anticavitation module

For applications that require minimal back pressure in the tank port, a bolt-on module (Figure 27) is available that provides anticavitation performance superior to the meter-out poppet. This module is only available on models with the SAE 4-bolt flange. Modules are available with single and dual anti-cavitation check valves. Figure 28 shows typical performance data.

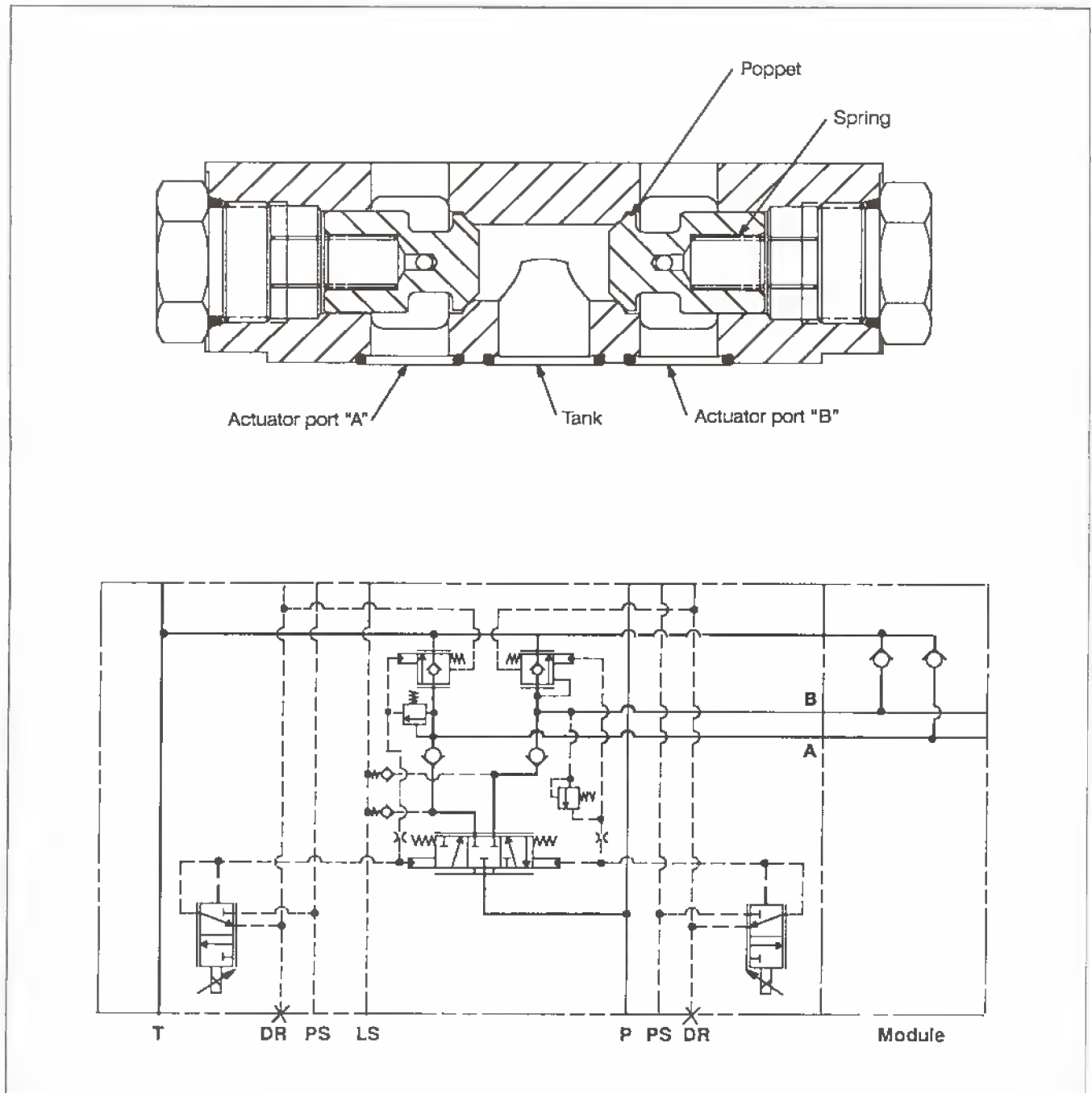


Figure 27

CMX ANTI-CAVITATION CHECK MODULE

Flow vs. Pressure Differential T → A

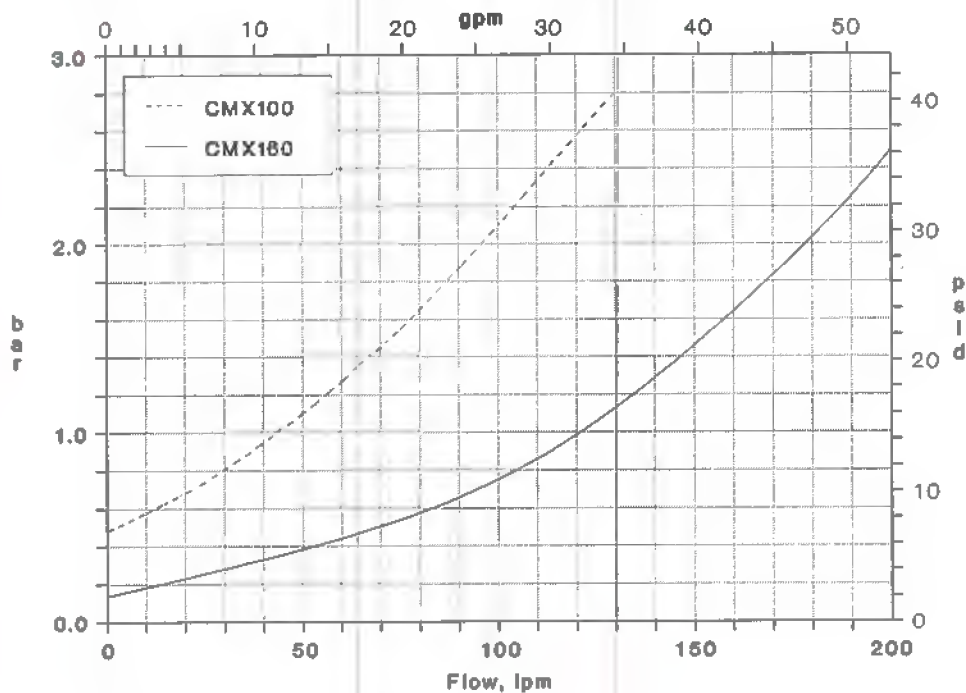


Figure 28

Float function

A feature inherent in the CMX valves is the float function capability which is similar to the fourth position float function on manual spool type mobile control valves. To activate the float function, both control ports are energized at the same time to the same pressure. This action pilots open both meter-out elements, while the meter-in spool remains centered due to the balanced pilot pressures. Pressure drop from actuator port to actuator port will depend on the meter-out poppet types employed and the cylinder area ratio.

To prevent cavitation caused by the uncommanded closing of the meter-out poppets as described on page 33, meter-out poppets with the reverse flow check valve or an anti-cavitation module should be used.

Figure 29 gives performance data for typical applications.

CMX160 "FLOAT" PERFORMANCE
FLOW vs. PRESSURE DROP (B → A)
 Flow B → T → A (T Blocked)

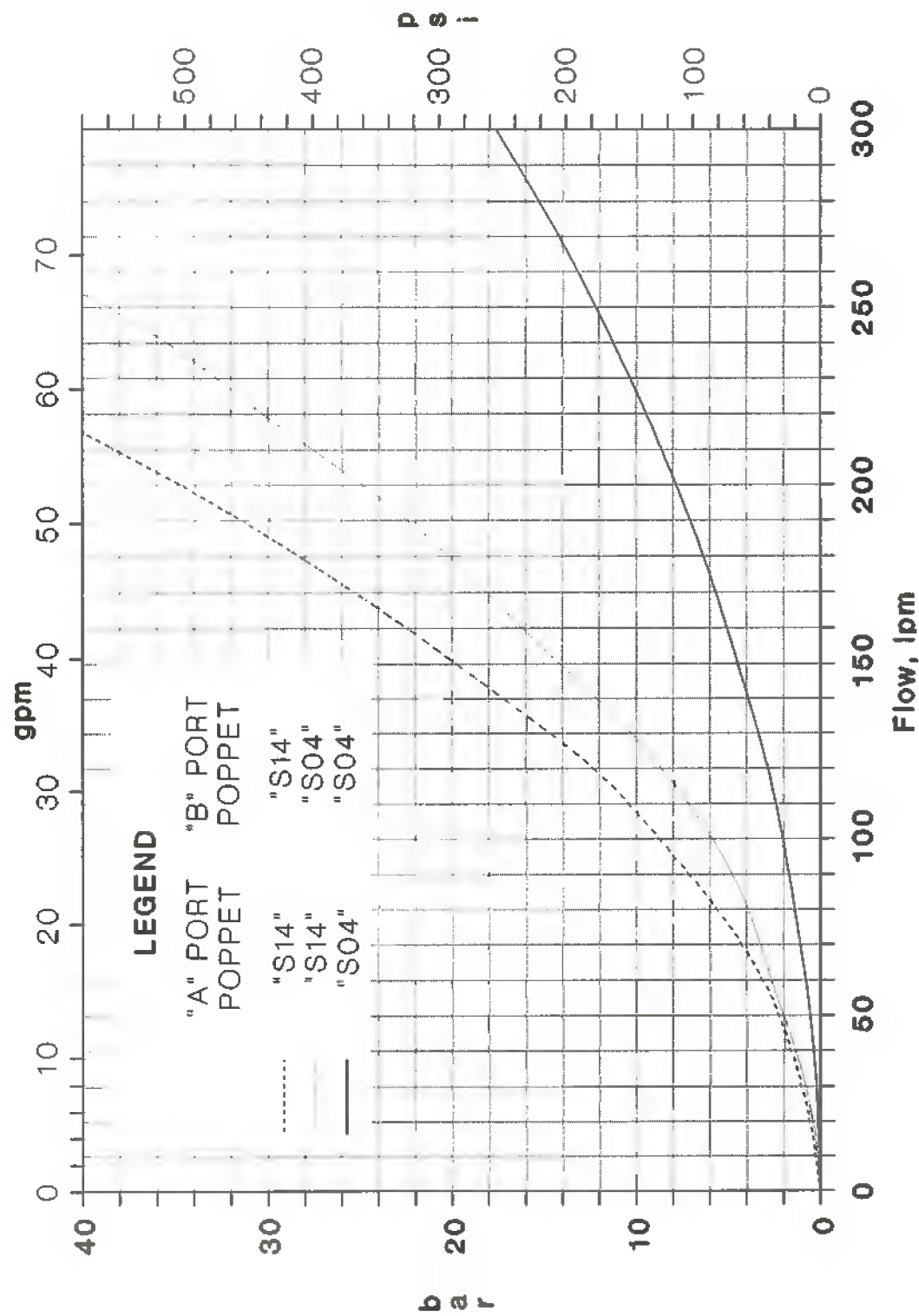


Figure 29

Meter-out spool

A version of the CMX that replaces the meter-out poppets with a spool is available. This version does not provide

meter-out metering, load holding or relief valve protection. This version can be used with counterbalance valve circuits. Two meter-out spool versions

are available; one is open in neutral, the other provides restricted flow to tank in neutral. The restriction is equivalent to a 0.75 mm (.030 in.) orifice.

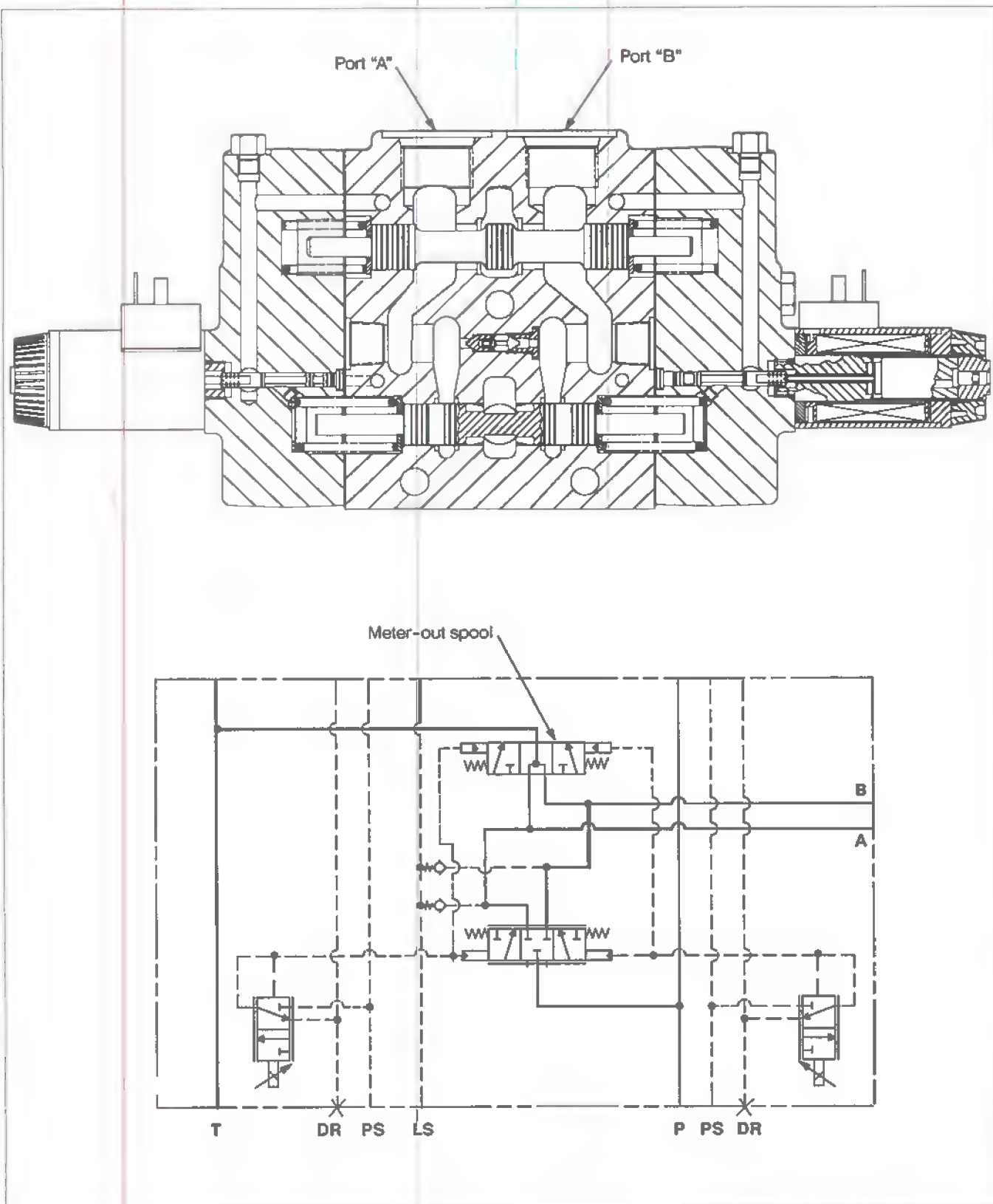
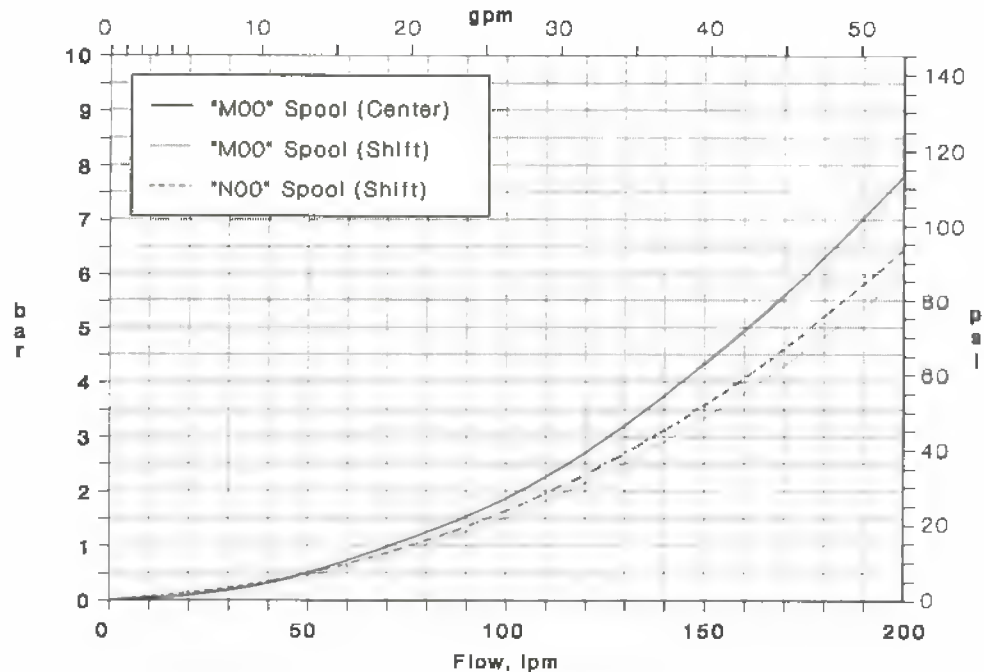


Figure 30

CMX100 METER-OUT SPOOL PERFORMANCE

Flow vs. Pressure Differential A-T

Flow A → T



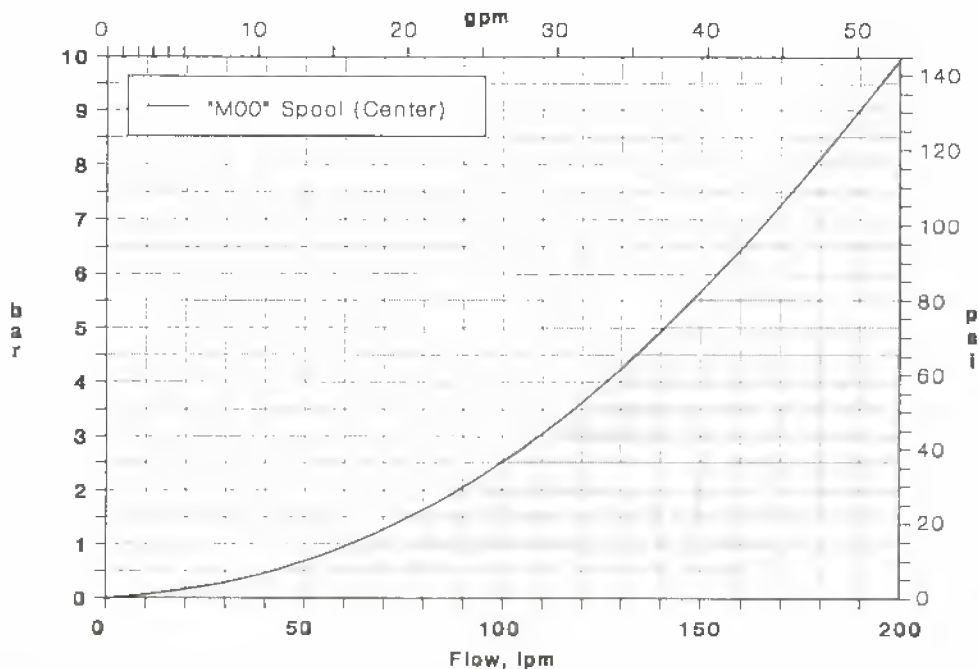
NOTE: Centered spool malfunctions at flows above 200 lpm

Figure 31a

CMX100 METER-OUT SPOOL PERFORMANCE

Flow vs. Pressure Differential A-B

Flow A → T → B (T Blocked)



NOTE: Centered spool malfunctions at flows above 200 lpm

Figure 31b

Actuator port relief valve

The actuator port relief valve uses a pilot stage to provide a pilot signal to the meter-out servo that, in turn, opens the meter-out poppet to relieve fluid to tank.

The relief valve pilot stage consists of a poppet, seat and spring (Figure 32). When actuator port pressure overcomes the relief valve spring force, the relief valve poppet moves off its seat and

fluid flows into the passage in the control cap gasket (on hydraulic models, the relief valve poppet seat is incorporated into the load drop check retainer).

This is the same passage that communicates the meter-in spring chamber to the meter-out piston. A restriction in the control cap gasket is located in this passage between the relief valve poppet and the meter-in spring chamber (between the relief

valve poppet and reducing valve on electrohydraulic models). Flow from the relief valve through the restriction causes pressure to build on the relief valve side of the restriction and is transmitted directly to the meter-out piston, which in turn opens the meter-out servo and meter-out poppet, relieving pressure in the actuator port. The relief valve setting is adjustable by shimming the pilot poppet spring. Relief valve override characteristics are given in Figures 33 and 34.

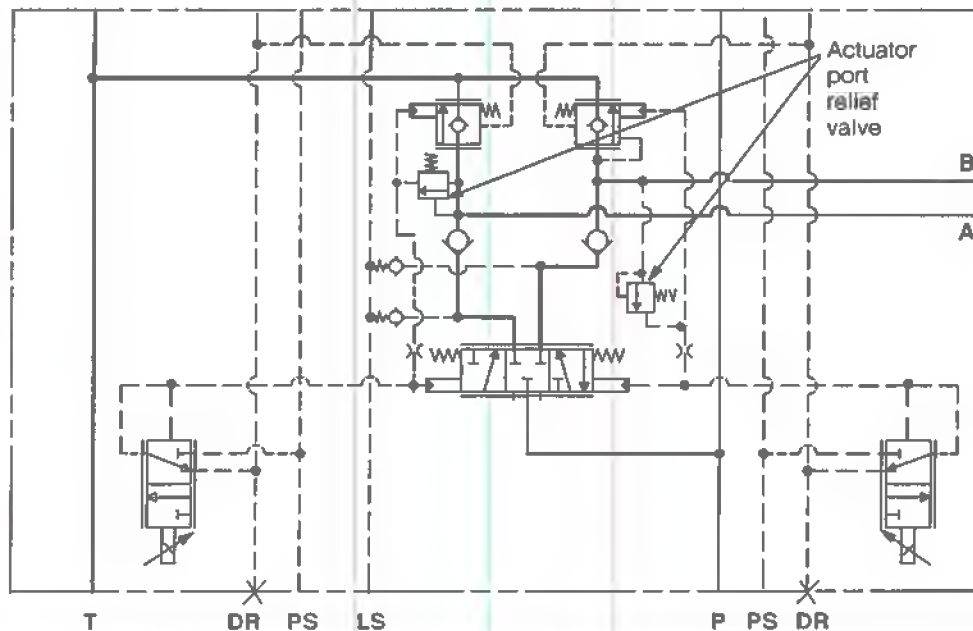
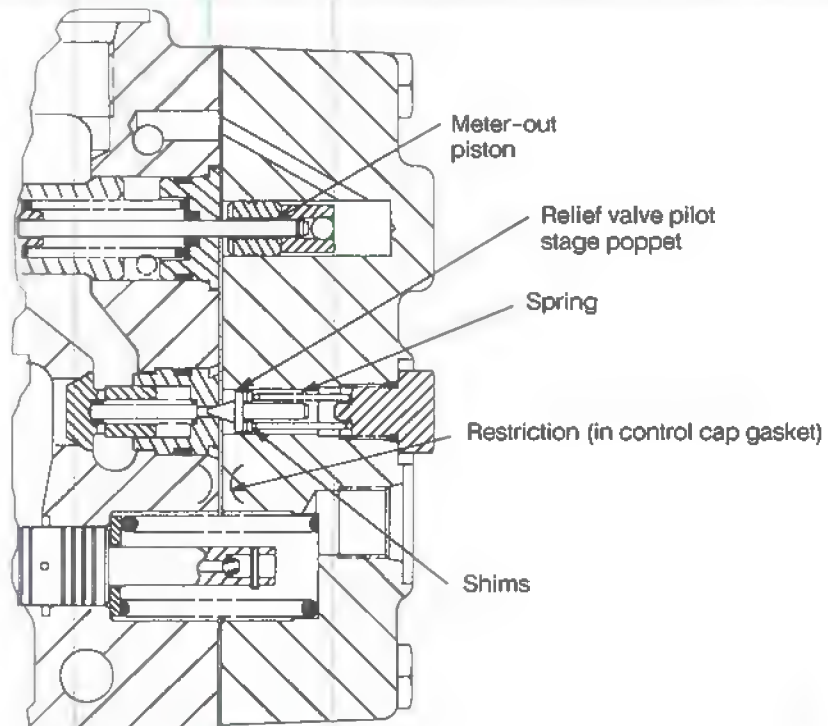


Figure 32

**CMX100 SECTIONAL VALVE
RELIEF VALVE OVERRIDE
"S03" METER-OUT POPPET**

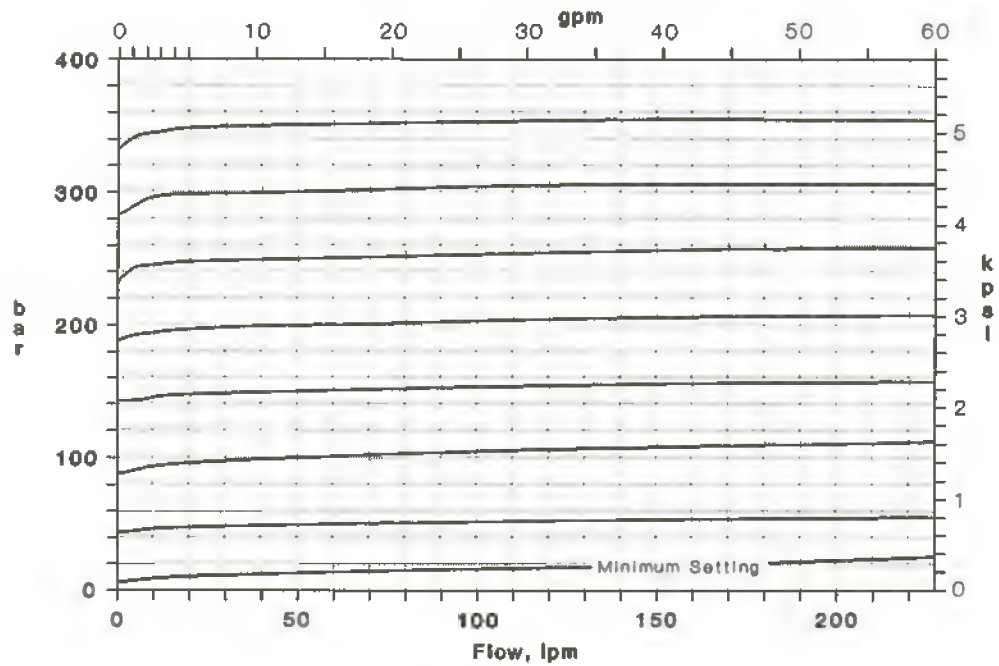


Figure 33a

**CMX100 SECTIONAL VALVE
RELIEF VALVE OVERRIDE
"S14" METER-OUT POPPET**

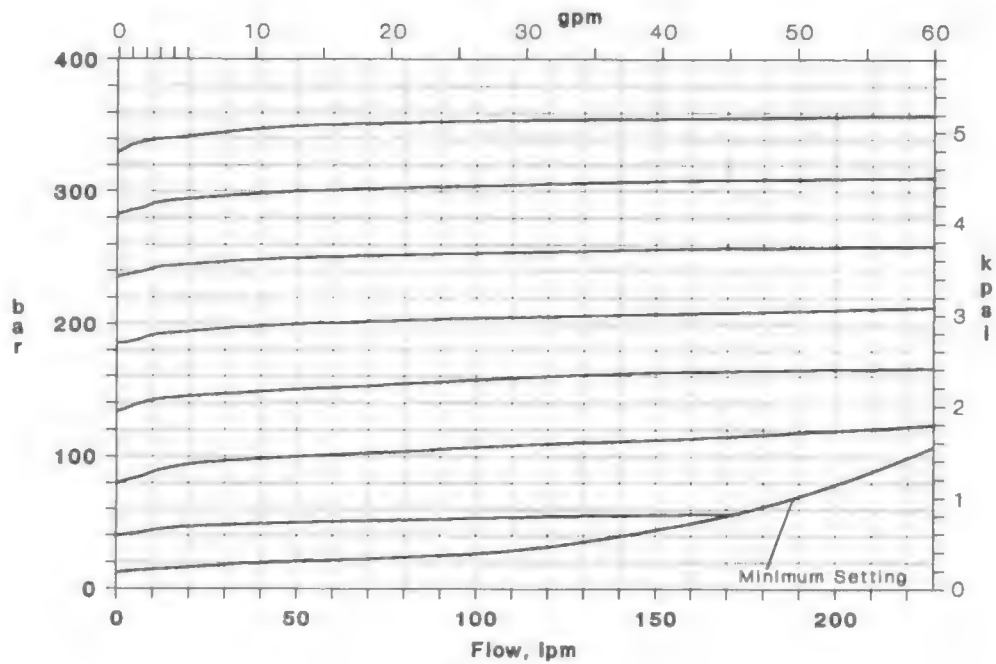


Figure 33b

CMX100 SECTIONAL VALVE
RELIEF VALVE OVERRIDE
"S90" METER-OUT POPPET

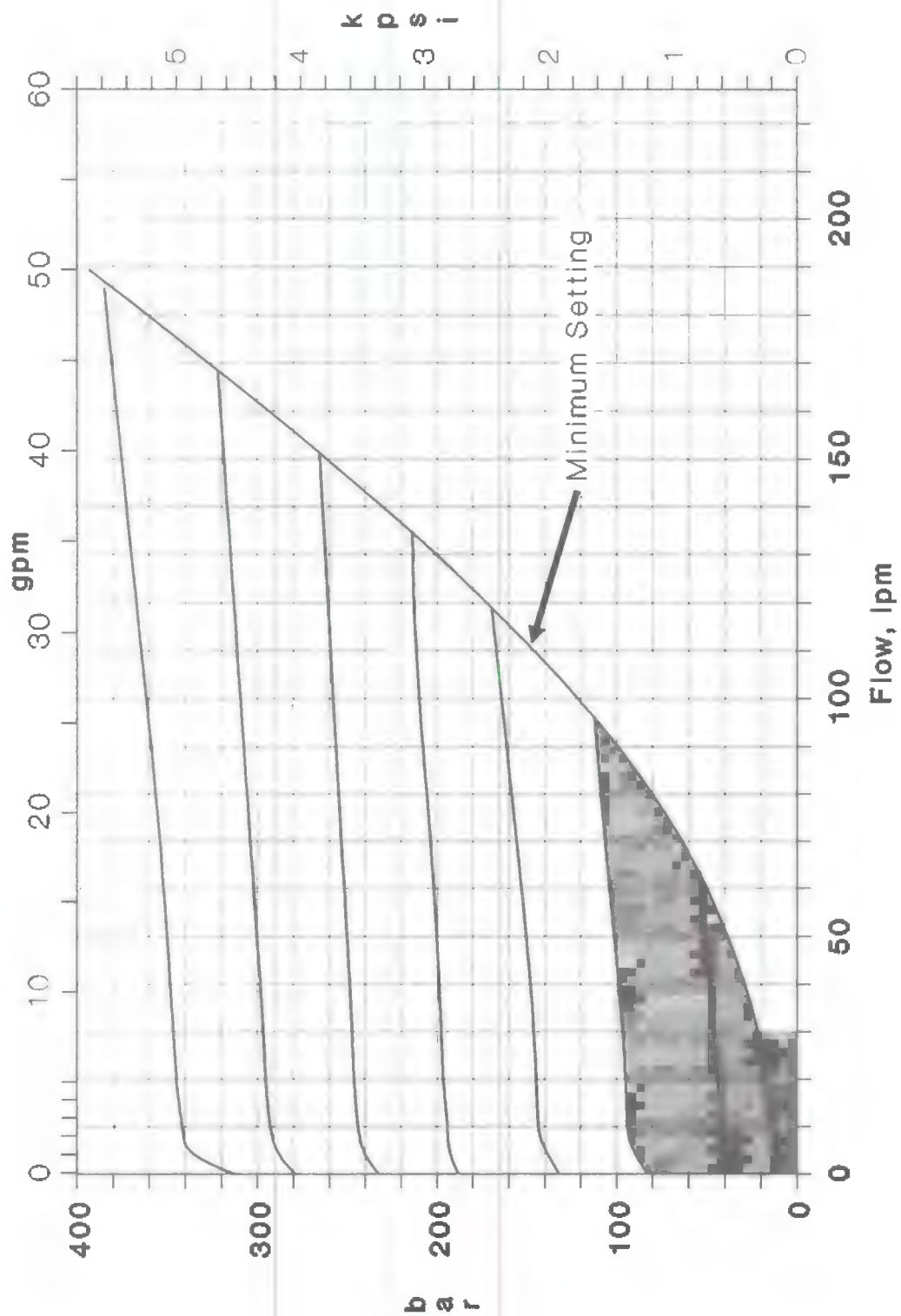


Figure 33c

CMX160 SECTIONAL VALVE
RELIEF VALVE OVERRIDE
"S04" METER-OUT POPPET

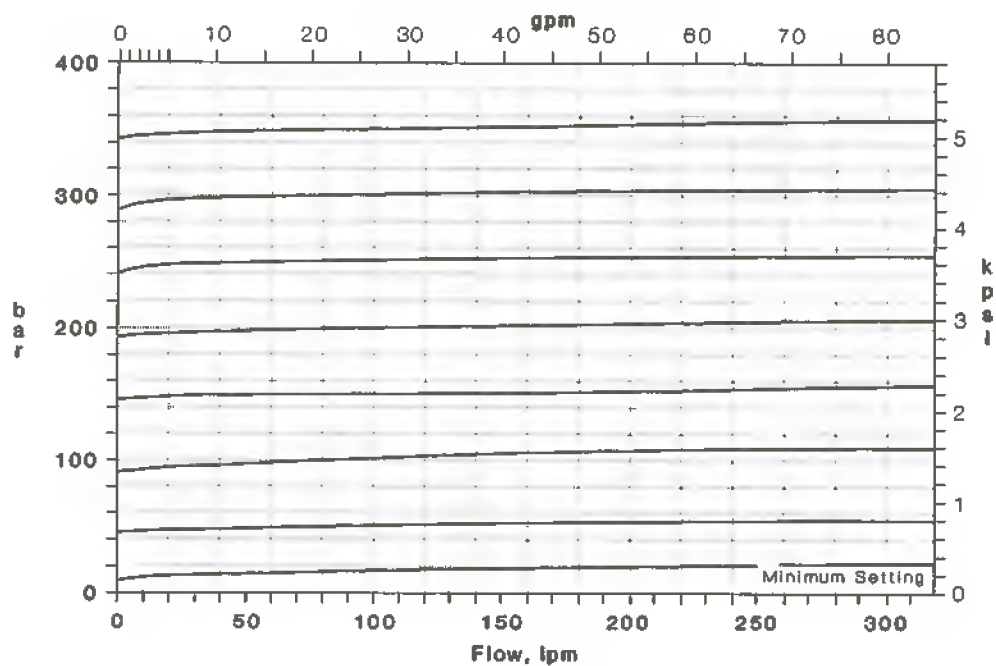


Figure 34a

CMX160 SECTIONAL VALVE
RELIEF VALVE OVERRIDE
"S07" METER-OUT POPPET

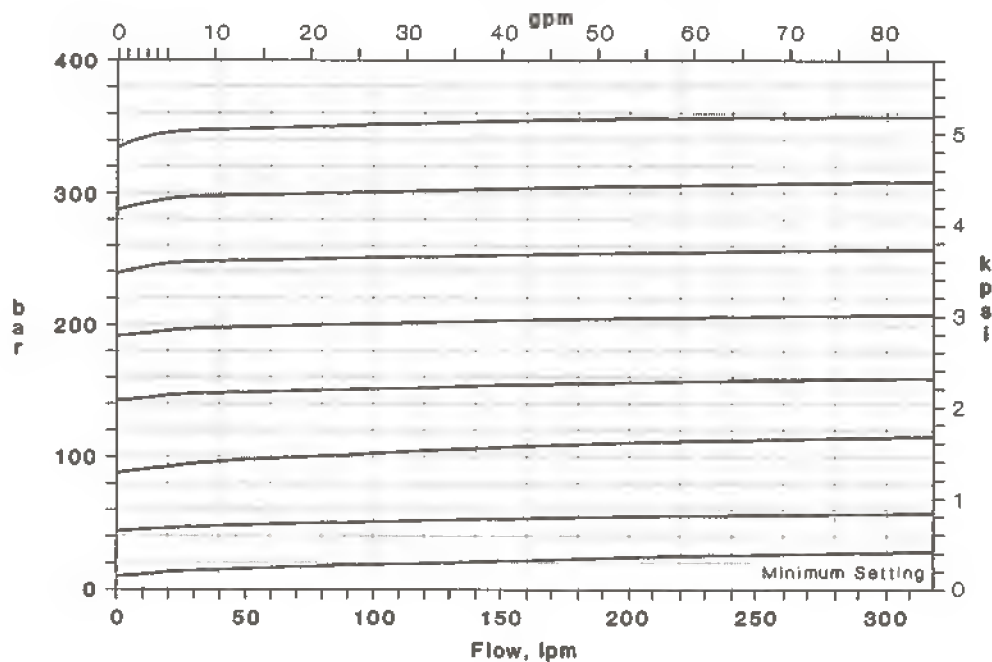


Figure 34b

CMX160 SECTIONAL VALVE
RELIEF VALVE OVERRIDE
"S14" METER-OUT POPPET

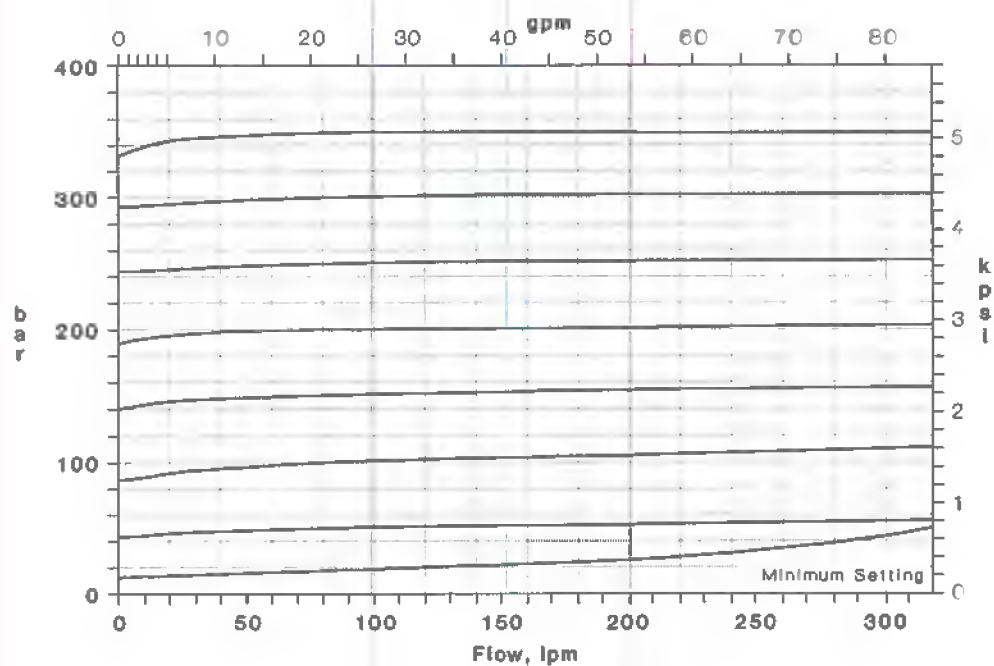


Figure 34c

CMX160 SECTIONAL VALVE
RELIEF VALVE OVERRIDE
"S56" METER-OUT POPPET

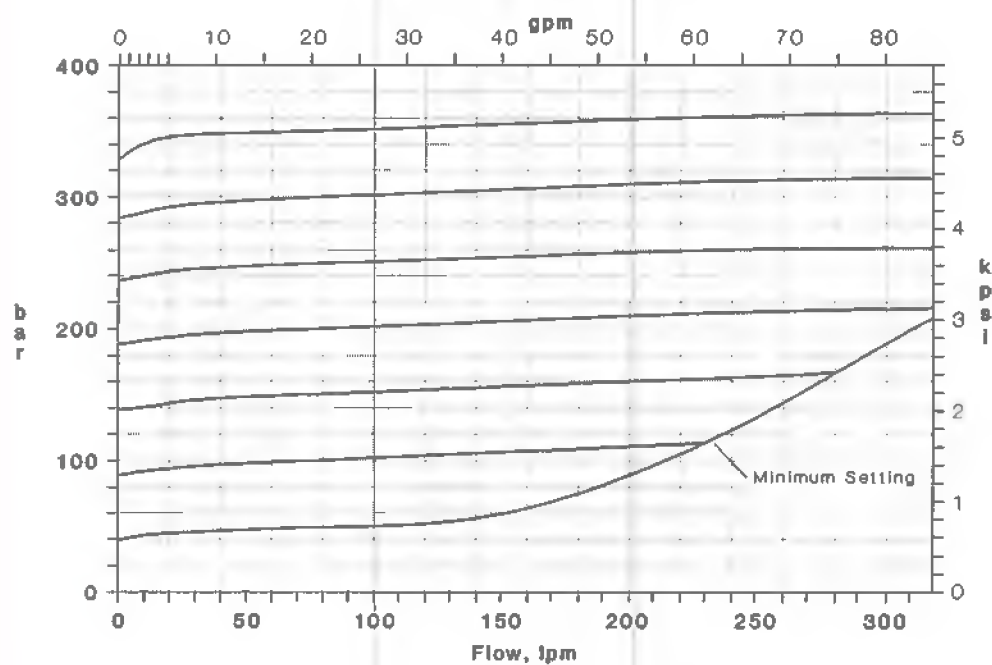


Figure 34d

Hydraulic actuation

Pilot pressure is supplied to each section via two #6 SAE O-ring boss ports (.563-18 UNF-2B straight thread) located on each control cap. Pilot drain connections can be made internally to the tank port or externally to the reservoir. External drain is always the preferred configuration and **MUST** be used if tank pressure is high due to the installation or a back pressure check valve, or if high pressure transients ("spikes") are likely.

It is important to note that the meter-out servo is referenced to the valve bank drain, while the meter-in spool is referenced to the opposite port command pressure. This requires the HRC drain pressures to be considered, since different drain pressures for the valve bank and the HRC will alter meter-in and meter-out phasing. Ideally, both the HRC and the CMX valve bank should be drained directly to reservoir via generous lines.

Hydraulic actuation data is given below.

Pilot Pressure	M/O bar (psi)	M/I "06" Spring bar (psi)	M/I "12" Spring bar (psi)
Crack	4.2 (61)	6.2 (90)	11.4 (175)
Rated flow	13.8 (200)	15.5 (225)	20.7 (300)

Tolerance: ± 1 bar

Pilot Requirements:

Pressure: 34 bar (500 psi) max.
Flow: 12 lpm (3 USgpm) recom.
Filtration: 25 microns or finer

Required shift volume (displacement):

Metering	CMX100	CMX160
M/I (neutral to full stroke)	1.63 cc	2.56 cc
M/O	1.01 cc	2.56 cc

CMX 100 VALVE (HYDRAULIC ACTUATION)
Typical Meter-In Hysteresis

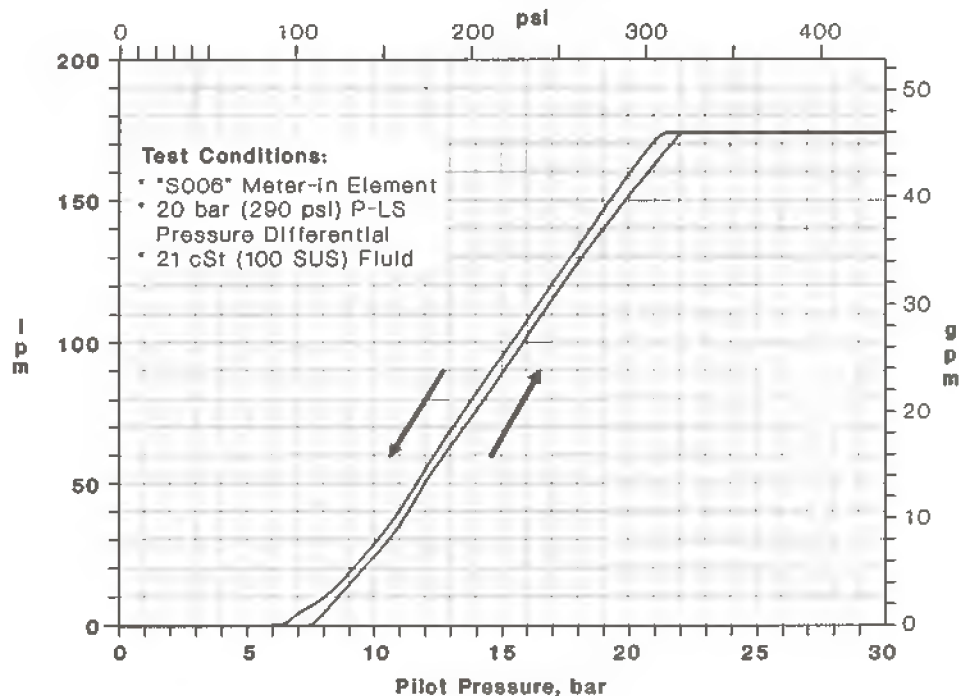


Figure 35a

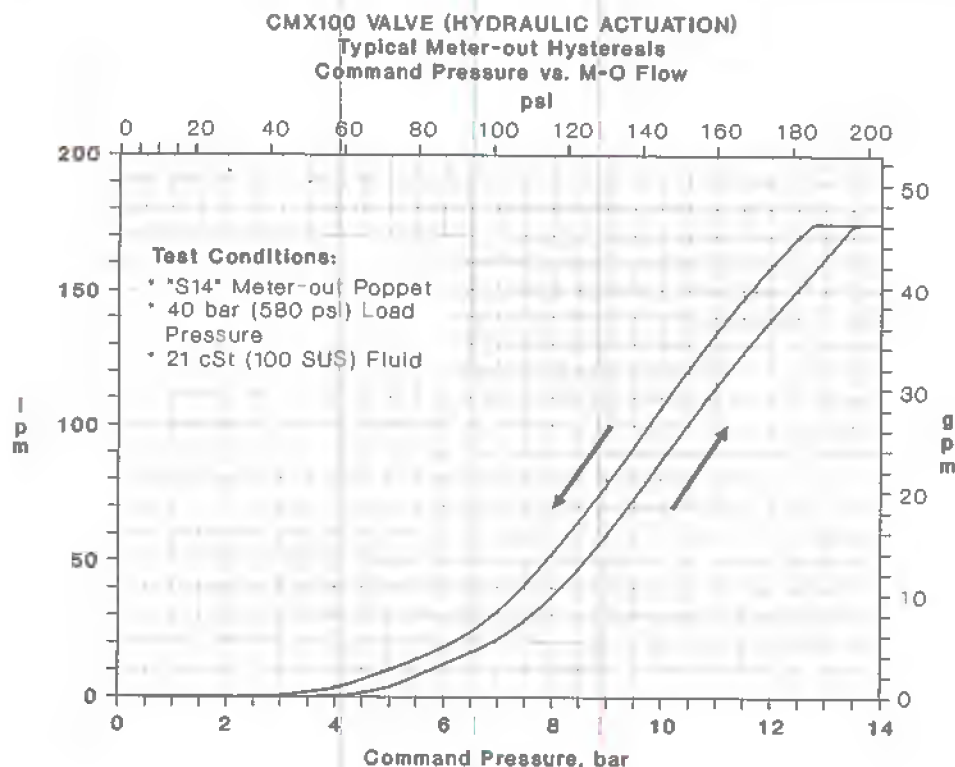


Figure 35b

Electrohydraulic actuation

Electrohydraulic CMX sectional valves operate on the same principles as the hydraulic valves, with the addition of an electrohydraulic proportional reducing valve (Figure 36) to convert an electrical input signal to a proportional command pressure signal that operates the valve. The solenoid provides an output force proportional to the input current that acts on the solenoid end of the pilot spool.

When the solenoid is energized, the pilot spool is moved away from the solenoid, closing the command port to tank and opening the pilot supply to the command port. Command port pressure is supplied to the feedback end of the pilot spool through the passage in the end cap gasket. When the feedback pressure begins to balance the solenoid force, the pilot spool closes the pilot supply passage. As the command pressure rises (due to

leakage), the feedback pressure overcomes the solenoid, and the pilot spool moves to open the control port to tank. The pilot spool modulates to balance the feedback pressure against the solenoid output force, thus providing an output pressure proportional to the solenoid input current. The pilot spool and bore are designed for zero overlap, so deadband is minimized.

The pressure output serves as the command pressure to actuate the CMX meter-in and meter-out elements. The signal to the solenoid should be conditioned to a pulse width modulated voltage or current signal. DC power, up to the coil rating, may also be used for "on-off" operation.

Supply Voltages:	12/24 VDC
Maximum Current:	1.4/7 AMP
Recommended PWM Freq./Dither Freq.:	100 Hz

Solenoids are available with DIN standard 43650 plugs, SAE 6.35 mm (.250 in.) male blade connectors, or flying leads.

Valves are available with either internal or external pilot supply. On models with the internal pilot option, pilot pressure is supplied to the proportional reducing valve by an internal passage that is connected to the system supply passage in the inlet body. These models require that the minimum system pressure be maintained to the specified limits to assure proper valve actuation.

Electrohydraulic CMX valves may be operated manually in the event of electrical control failure by depressing the manual override pin, located on the end of each solenoid, with a screwdriver or similar tool.

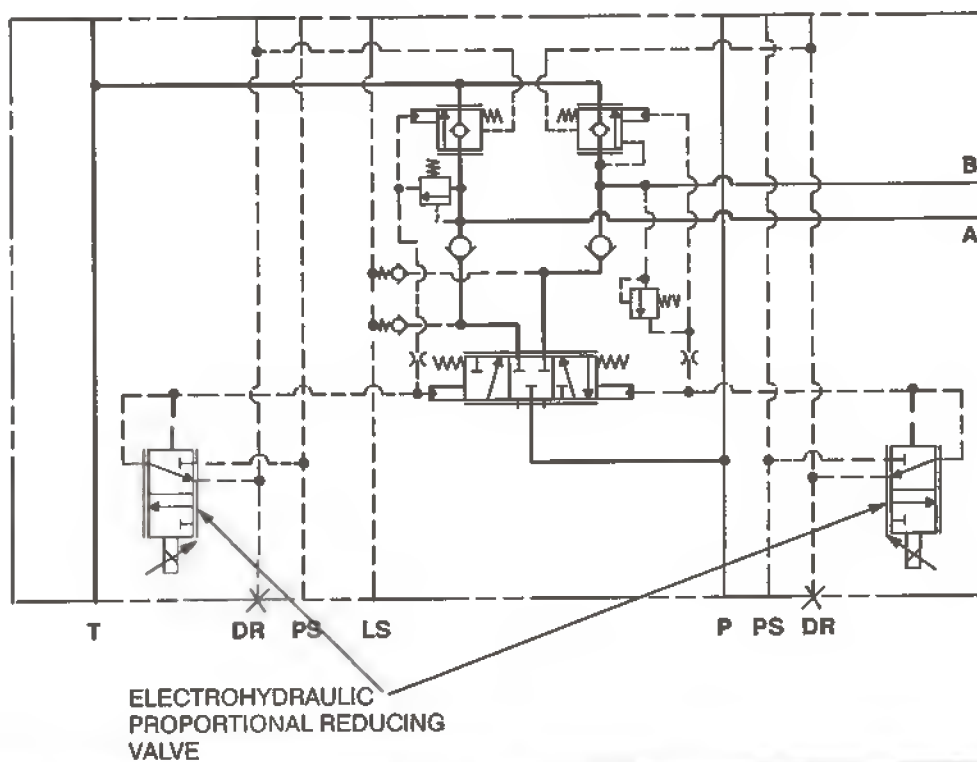
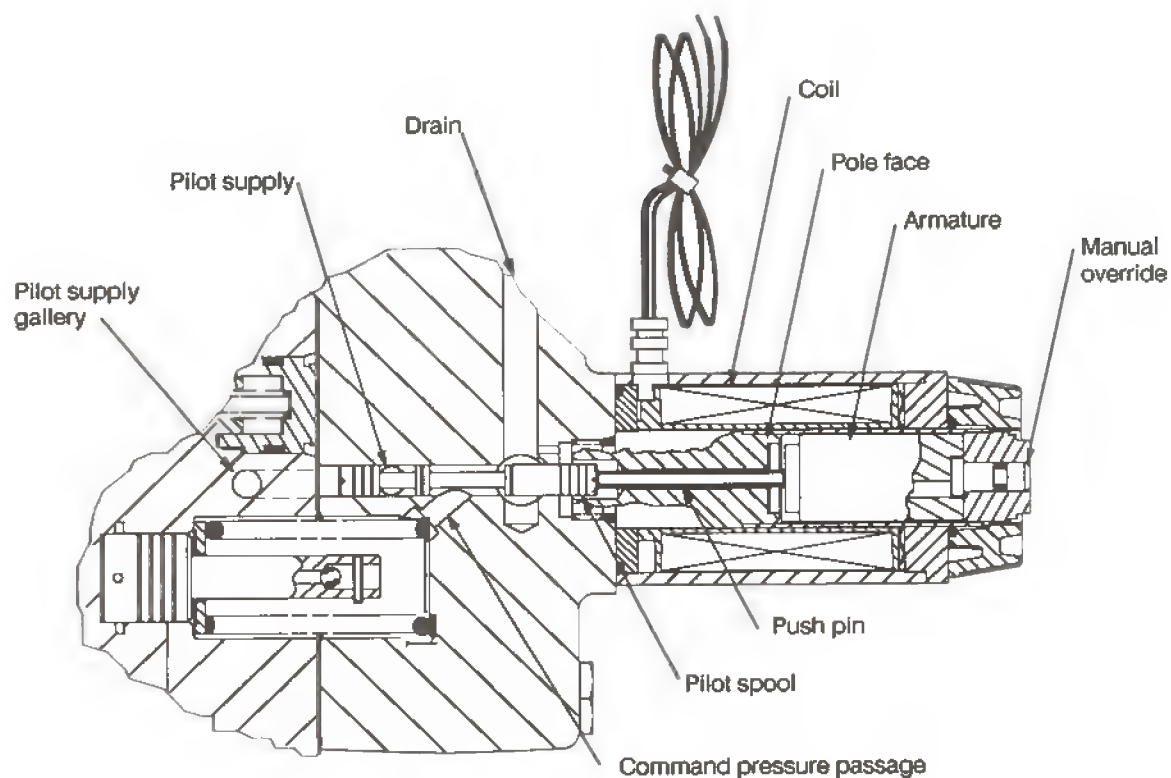


Figure 36

Electrohydraulic actuation

Internal pilot supply

Minimum system pressure:

Valves with Type "06" meter-in spring -
19 bar (275 psi)

Valves with Type "12" meter-in spring -
24 bar (350 psi)

External pilot supply

Minimum pressure:

Valves with Type "06" meter-in spring -
19 bar (275 psi)

Valves with Type "12" meter-in spring -
24 bar (350 psi)

Since both electrohydraulic reducing valves are referenced to a common drain via the end cover, drain pressure is not critical. Internal drain to tank and external drain options are available.

If high pressure transients are present in the tank line, then external drain should be used to avoid function interaction. If the tank pressure is above 8.6 bar (125 psi), then external drain should be used to avoid exceeding the pressure rating for the pilot passages (35 bar [500 psi]).

Under certain operating conditions (high inlet pressure, fully shifted, and open relief valve), pilot drain flow can be as high as 4 lpm (1 USgpm) for each active section. Total anticipated drain flow must be considered when sizing drain lines.

CMX ELECTROHYDRAULIC REDUCING VALVE
Output Pressure vs. Command Current

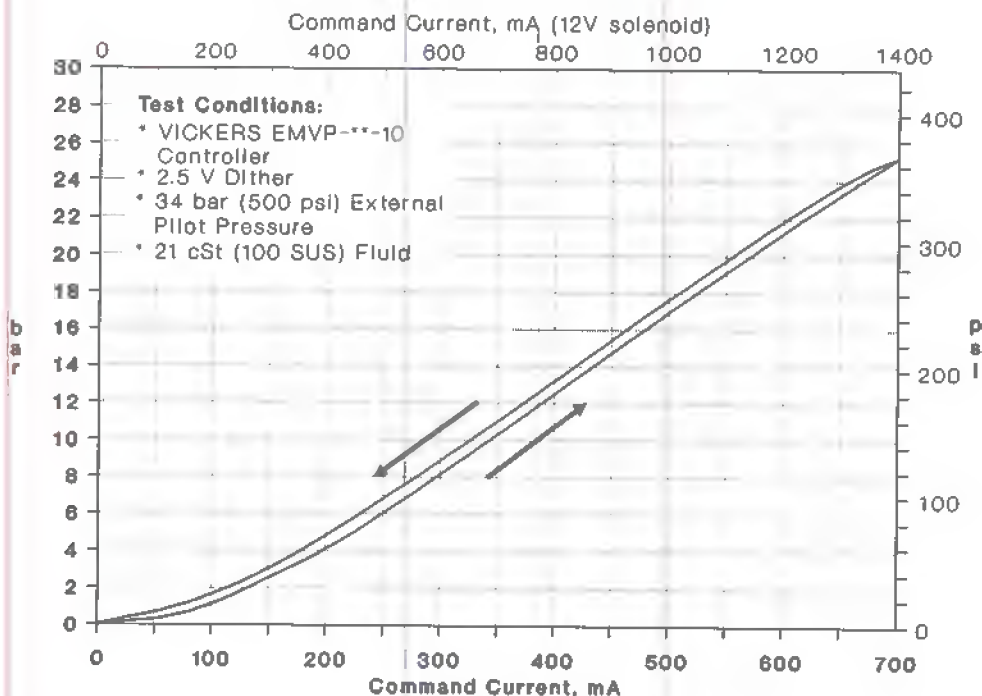


Figure 37

CMX 100 RELIEF VALVE RESPONSE Actuator Port Pressure vs. Time

This plot demonstrates the actuator port pressure response which can be expected when a load is abruptly applied to an actuator, such as an excavator bucket hitting a rock while the boom is being lowered. The response is system-dependent, so actual performance may vary.

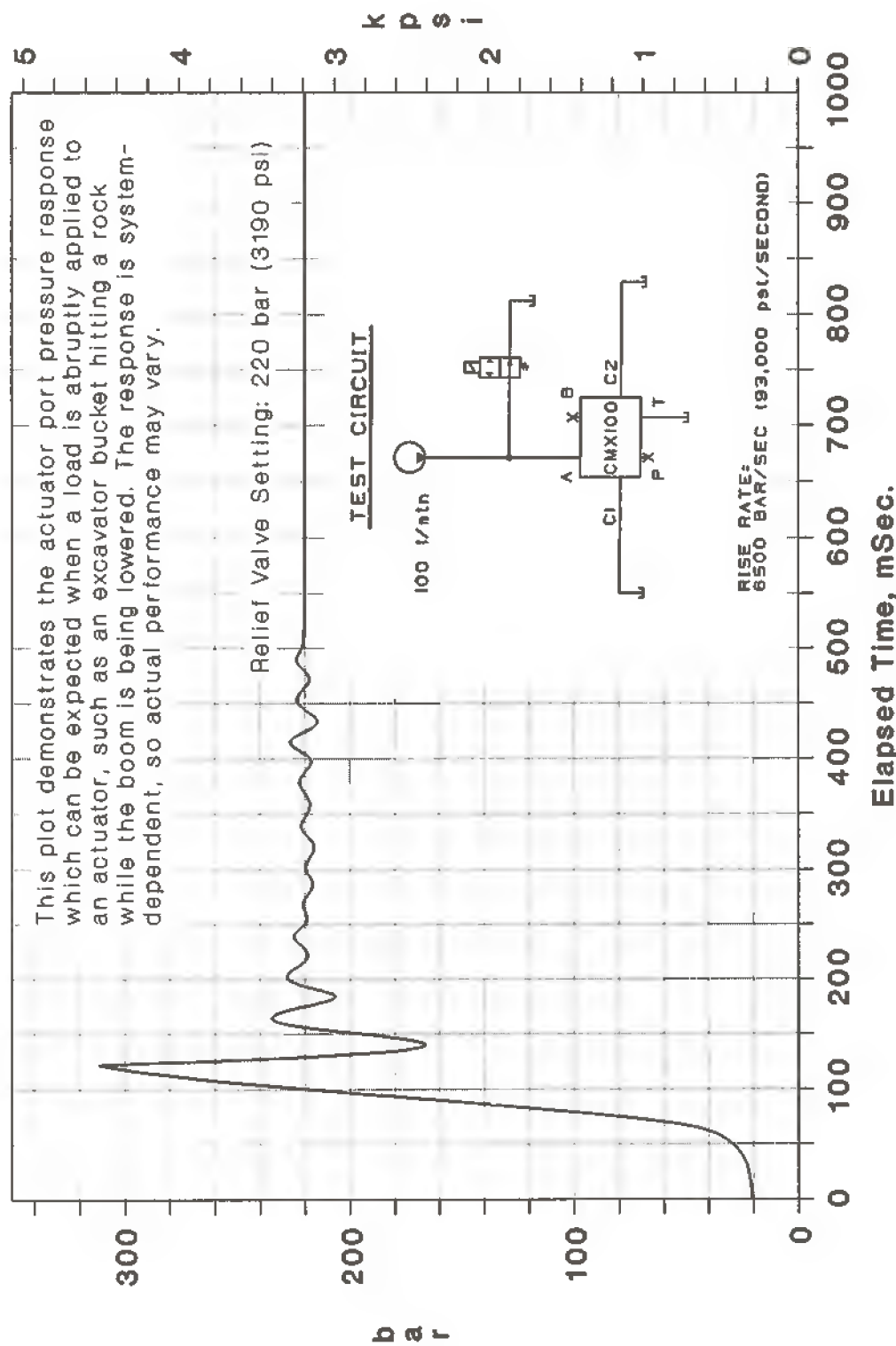


Figure 38a

CMX 100 RELIEF VALVE RESPONSE

Actuator Port Pressure vs. Time

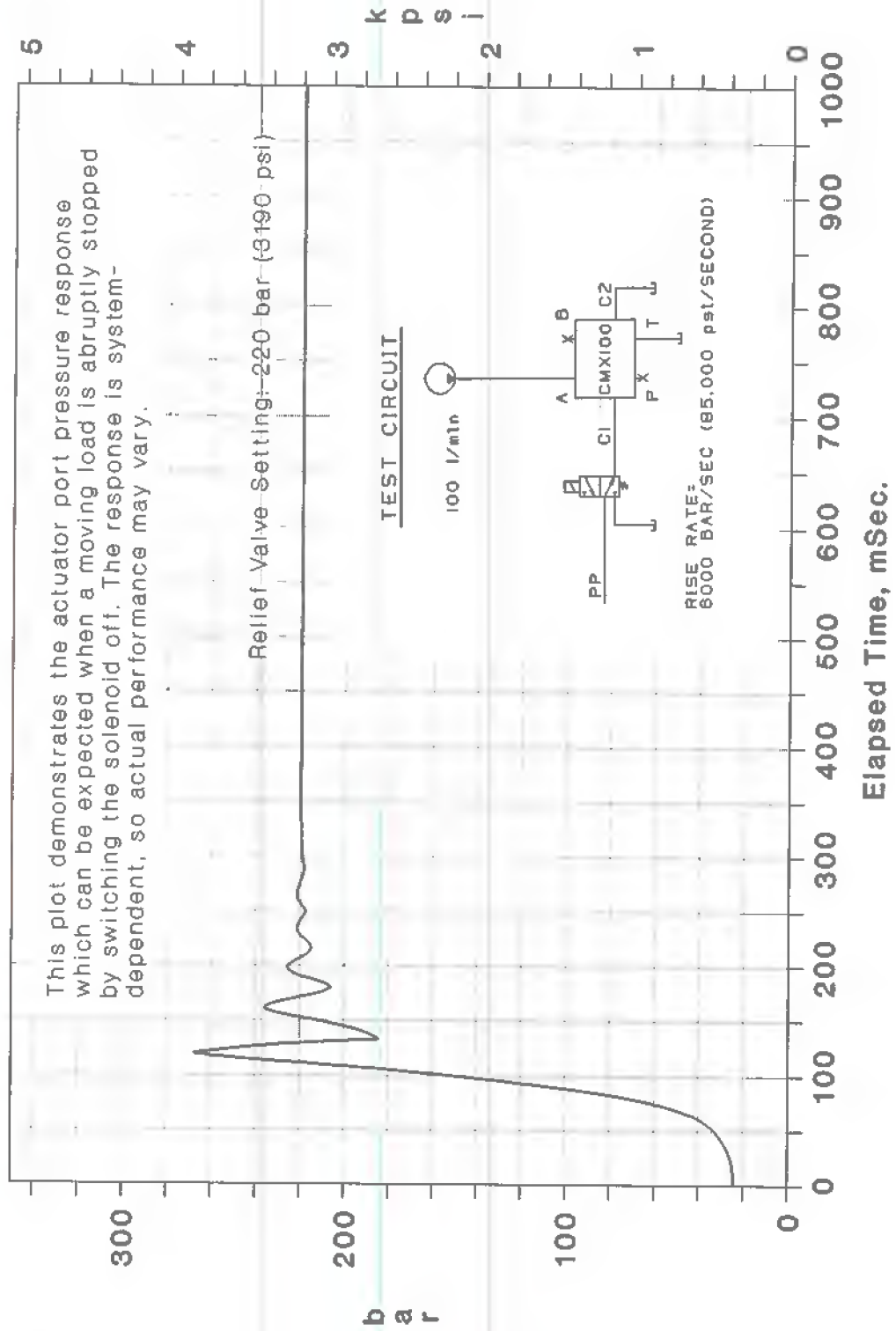


Figure 38b

CMX 100 RELIEF VALVE RESPONSE

Actuator Port Pressure vs. Time

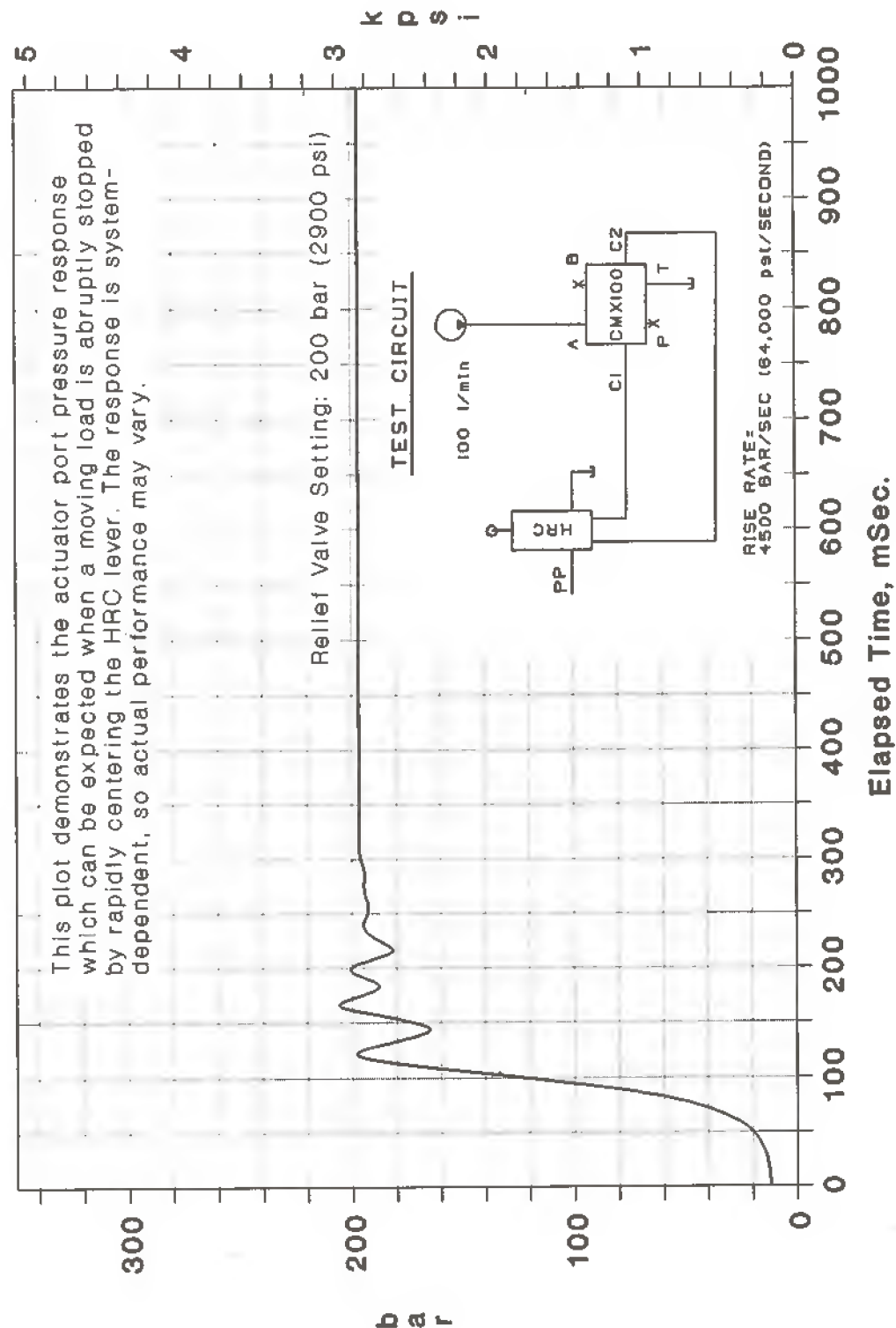


Figure 38c

End Cover

An end cover (Figure 39) is required to terminate each valve bank. The end

cover provides a passage that connects the control cap drain galleries from either side of the valve body.

Additionally, several optional features are located in the end cover:

Internal/external drain:	Provides choice of internal or external drain (see "Actuation", pages 45 and 46).
Aux. load sense:	Provides load sense series connection for multiple valve banks (see "Load Sensing Check Valves", page 24).
Load sense decompression orifice:	Provides load sense decompression to drain via a 0.50 mm (.020") screened orifice.
Load sense decompression valve:	Provides pressure compensated decompression flow to drain for reduced power loss.
Aux. "P" Port:	Augments "P" port in inlet body for special applications.
Aux. "T" Port:	Augments "T" port in inlet body for special applications.

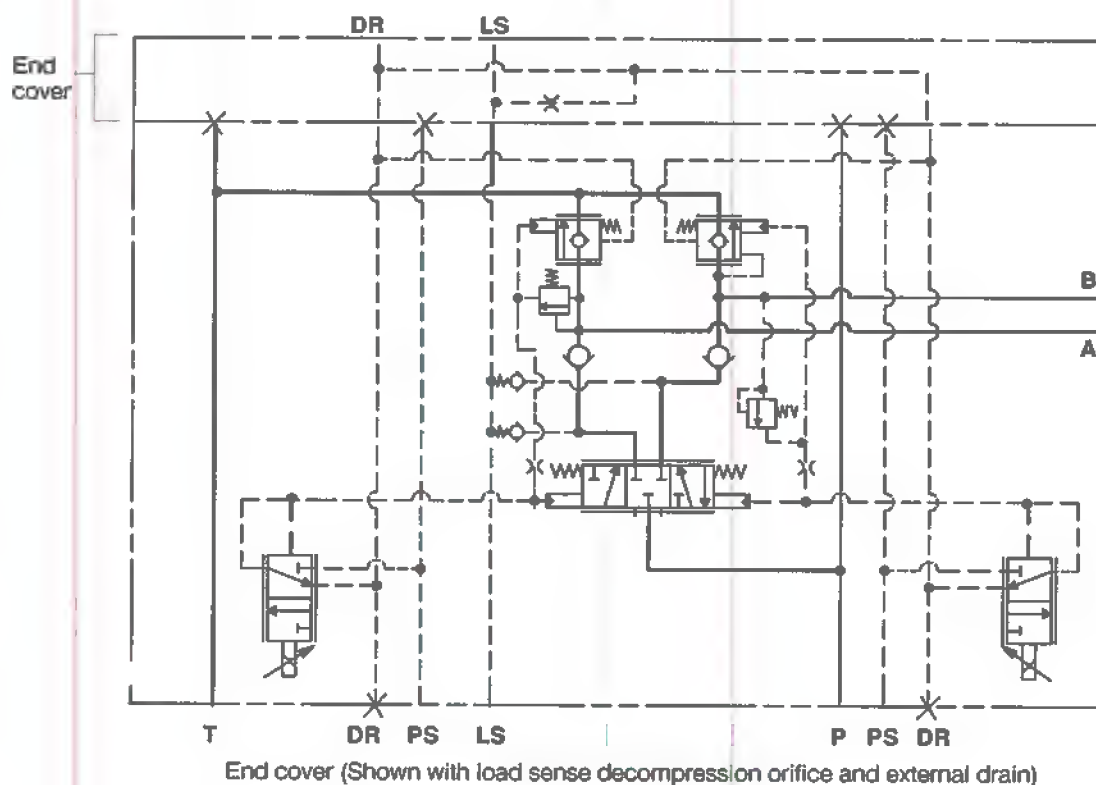
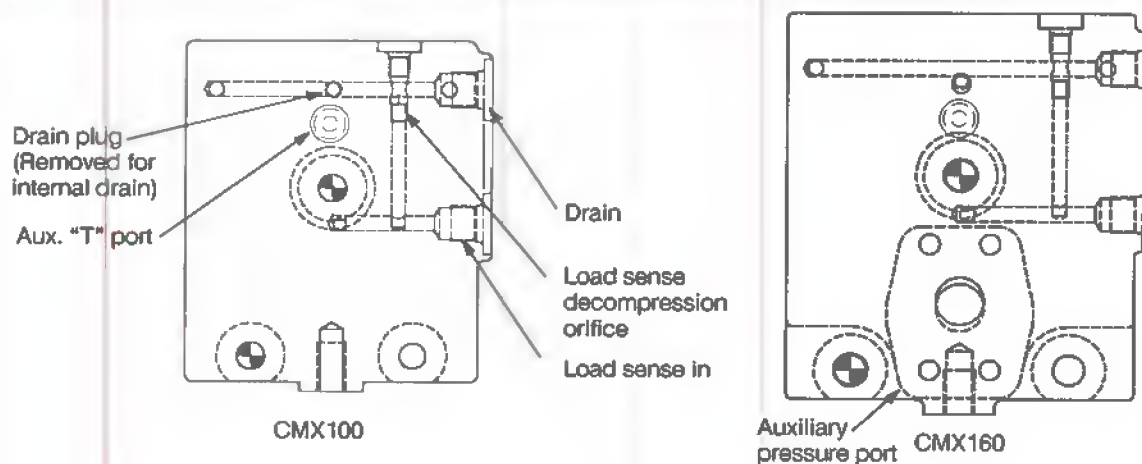


Figure 39

Special features

Meter-in pressure limitation

In this version (Figure 40), the orifice restriction in the control cap gasket is relocated to the inlet to the meter-in spring chamber.

This feature limits meter-in flow at a preset actuator port pressure.

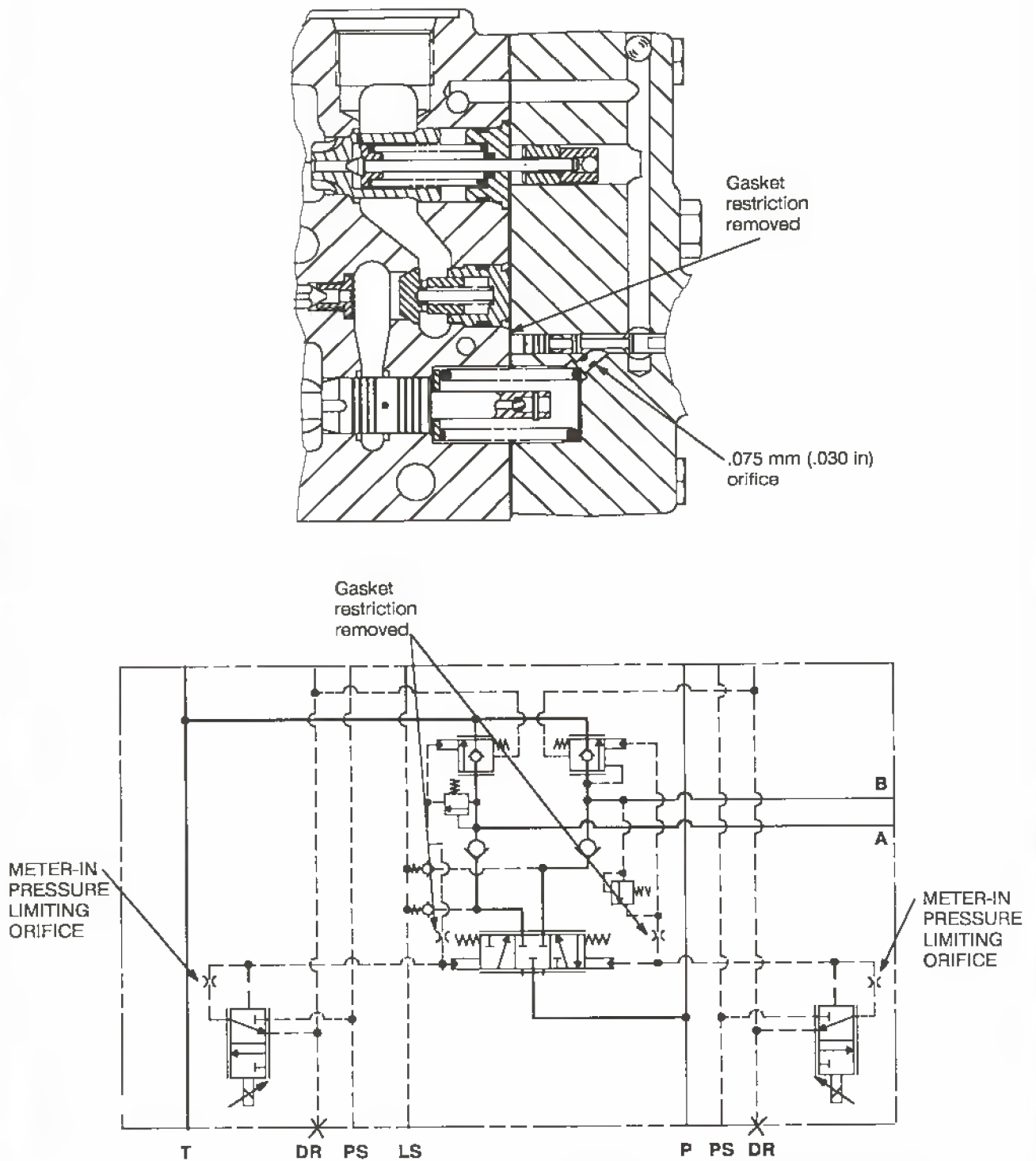


Figure 40

Meter-in pressure limitation

Meter-out poppet version (with port relief valves)

In valves with meter-out poppets, the port relief functions in the normal manner. But because the orifice has been relocated, the relief valve pilot stage also applies pilot pressure to the meter-in spool, which tends to oppose the command pressure. For example, assume we are driving a clamp cylinder "P" to "A". When the cylinder fully clamps, the "A" port relief setting is reached, and the pilot stage opens and builds pilot pressure to open the meter-out element. This pilot pressure also acts on the meter-in spool opposing the command pressure and tending to close the meter-in spool, which reduces the meter-in flow.

Since a pilot pressure of 4.2 bar (62 psi) is required to open the meter-out poppet, a significant reduction in flow, equivalent to 4.2 bar (62 psi) command pressure, through the meter-in spool will occur before the meter-out poppet opens. From the meter-in command vs. flow diagrams on page 13, the reduction in flow is about 50 lpm (13 USgpm) for the CMX100, and about 70 lpm (18 USgpm) for the CMX160.

The total amount of closing depends on the command signal and is limited by the relief valve override. When the meter-out element is opened enough to pass the full meter-in flow, further increase in relief valve pilot signal will not occur and, in turn, further shutoff of the meter-in is not possible. In Figure 41 the diagram shows the resulting inlet flow as the load pressure changes while the command current is fixed.

The meter-in pressure limitation feature limits horsepower losses through the open relief valves of a function with relief settings below the system pressure setting. It is particularly effective for swing functions where the relief valves are set to limit maximum torque. On these applications, with a moving load, meter-in pressure limitation can prevent any losses over an open port relief valve. The meter-in pressure limitation feature should be used with caution on functions where an overrunning gravity load is possible. With certain combinations of meter-out poppets and cylinder area ratios, uncommanded movement may occur.

CMX100 METER-IN PRESSURE LIMITATION
Actuator Port Pressure vs. Inlet Flow
 "S14" M-O POPPET, BLOCKED ACT. PORTS

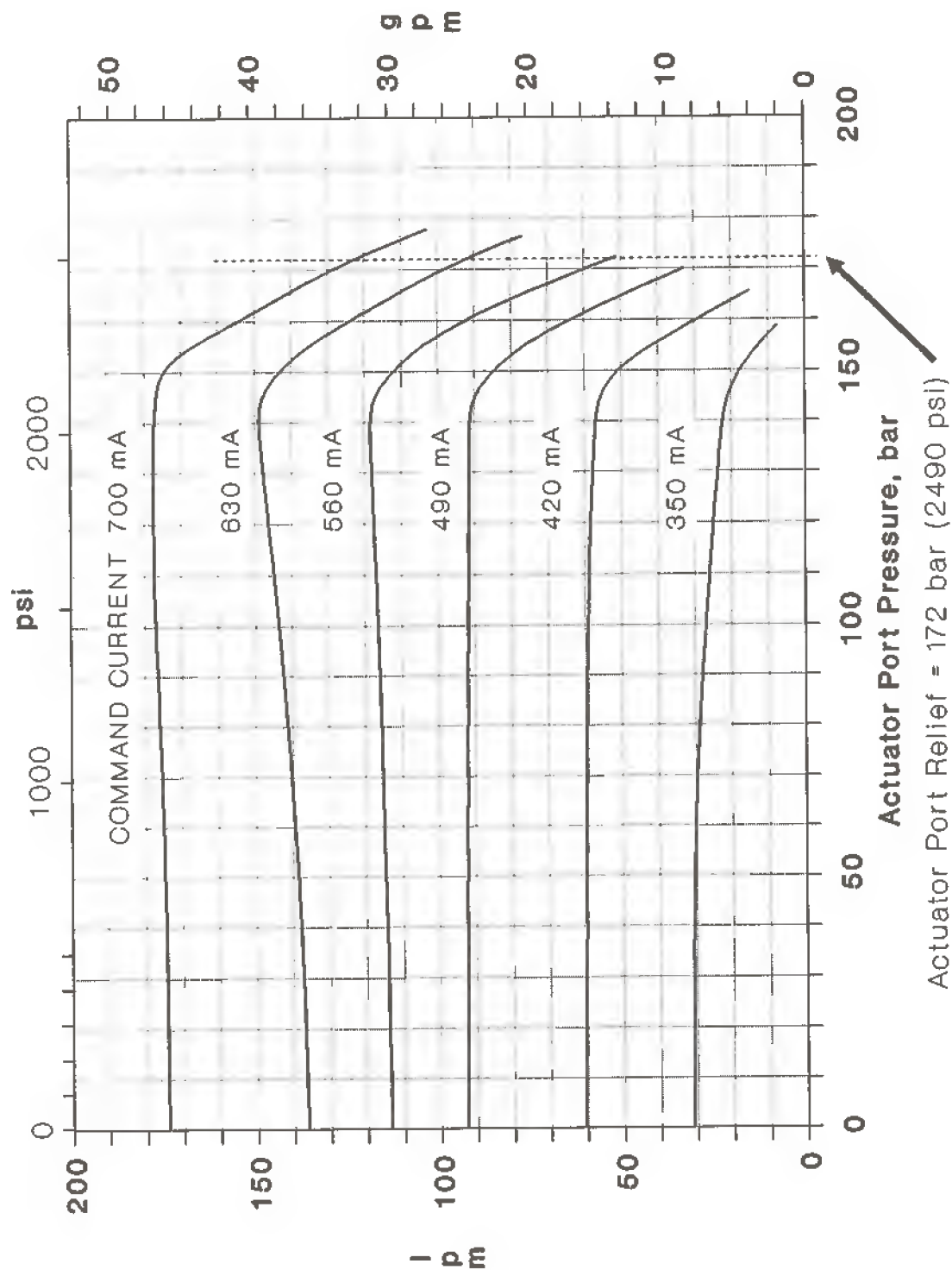


Figure 41

Meter-in pressure limitation

Meter-out spool version (no actuator port relief)

In valves with the meter-out spool option (Figure 42), a relief valve pilot stage is added (no relief pilot stage is

present in the standard configuration), and the orifice is located in the inlet to the meter-in spring chamber. When the pilot stage opens, the resulting pilot signal is applied to both the meter-in and the meter-out spools, opposing the command pilot pressure and tending to close both spools. Due to the phasing of the meter-in and meter-out spools

(the meter-in requires a higher pilot pressure to crack), the meter-in spool will completely shutoff flow before the meter-out spool will port fluid to tank. Thus, virtually no horsepower is lost when the function is stalled. This feature controls the maximum pressure to a function at a setting below the system pressure setting.

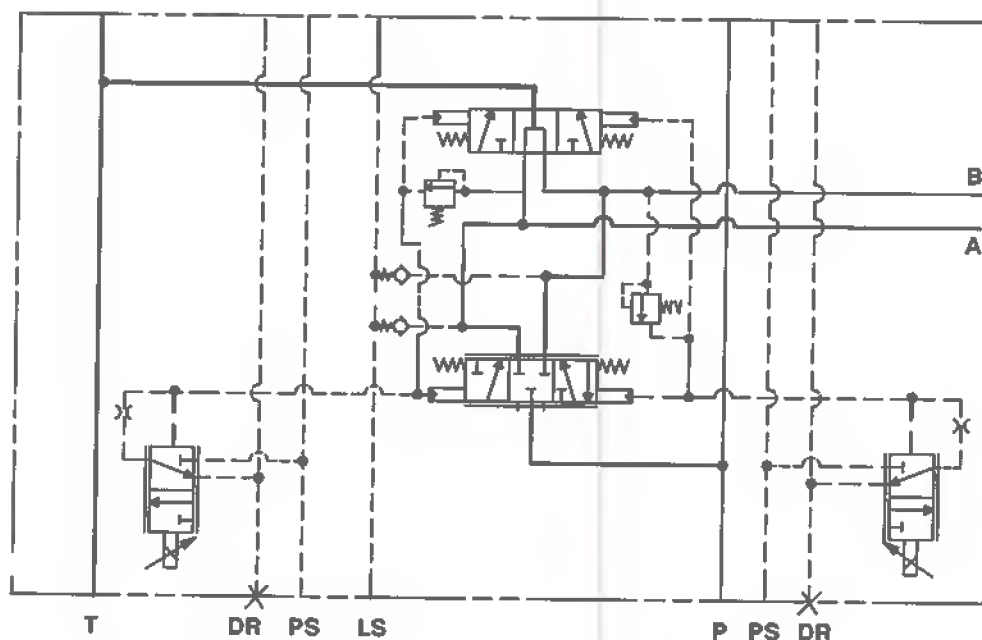
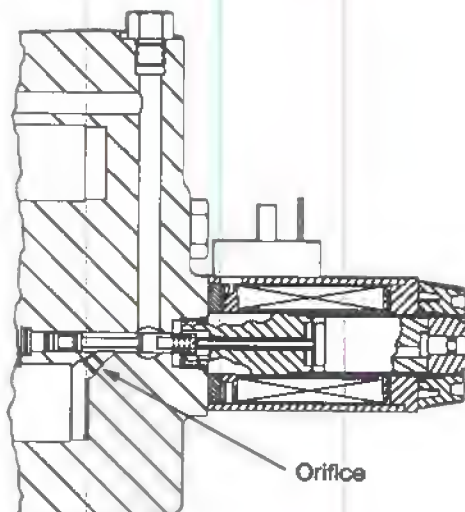


Figure 42

CMX100 METER-IN PRESSURE LIMITATION
Model "SP006-M0009" (M-O Spool Version)
Act. Port Pressure vs. Command Pressure

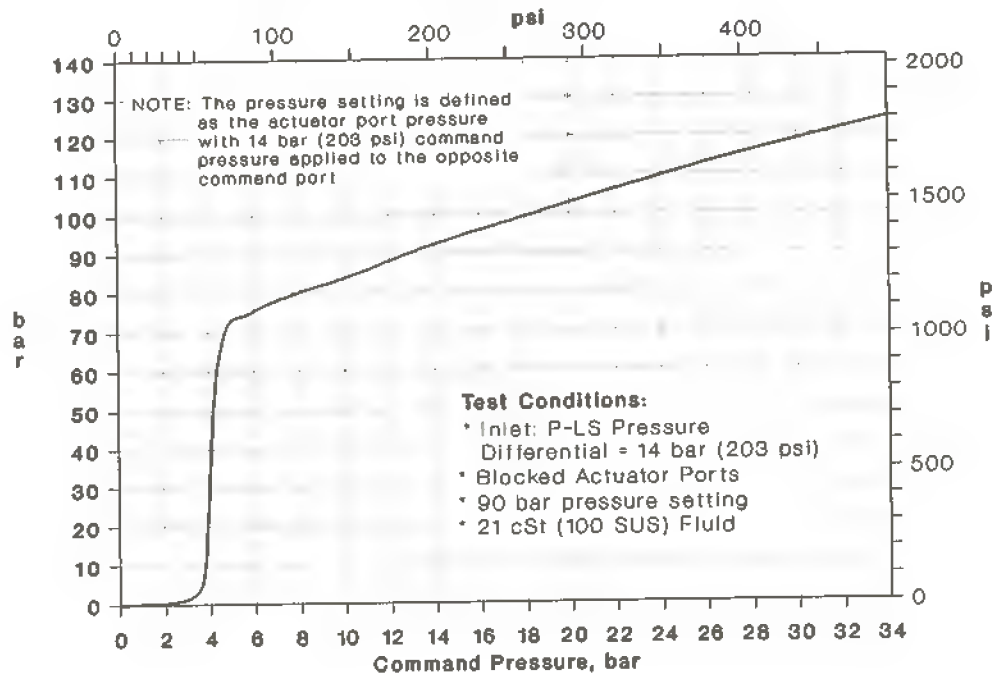


Figure 43

Swing drive with free coast

This function utilizes a meter-out spool and a pressure controlling meter-in element. Combining these features provides acceleration control with minimal braking. Typical applications include swing drives and propel functions where braking control is not required or is accomplished by a mechanical brake.

Both actuator ports must be connected together externally by the user or by an optional bolt-on block. The optional bolt-on block is available only on the flange port sections. An option is available which uses only one meter-out poppet when a large meter-out flow area is not required.

The dual poppet meter-out version is not available for the electrohydraulic narrow body "S2" sections.

High flow single acting CMX

This option extends the flow range for the CMX valve on applications requiring only a three-way valve. The meter-in spool is spring biased to one end of its bore, and as it is piloted open, it ports fluid first to the "A" port then to both cylinder ports simultaneously. The meter-out poppets remain closed when lifting. For lowering, the meter-in spool remains closed.

For superior metering while lowering, different gain meter-out poppets can be selected.

HIGH FLOW, SINGLE ACTING CMX

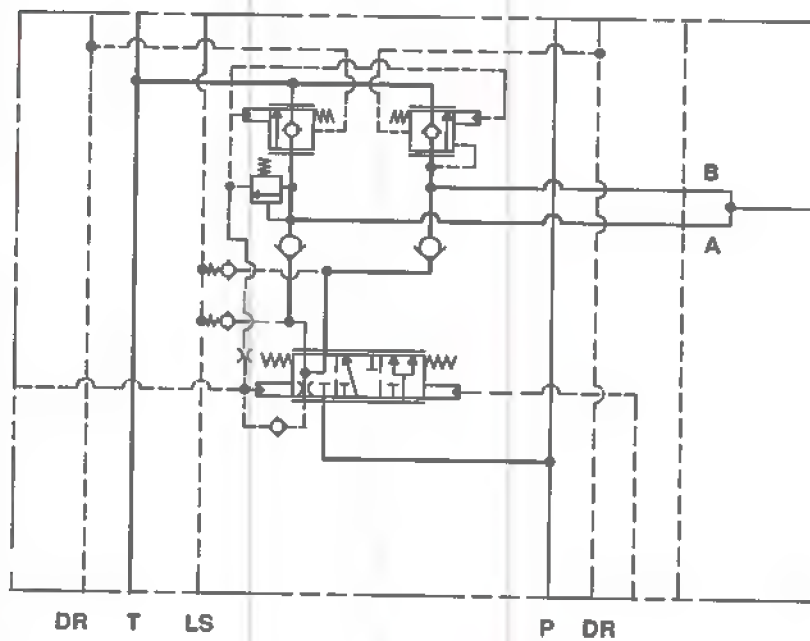
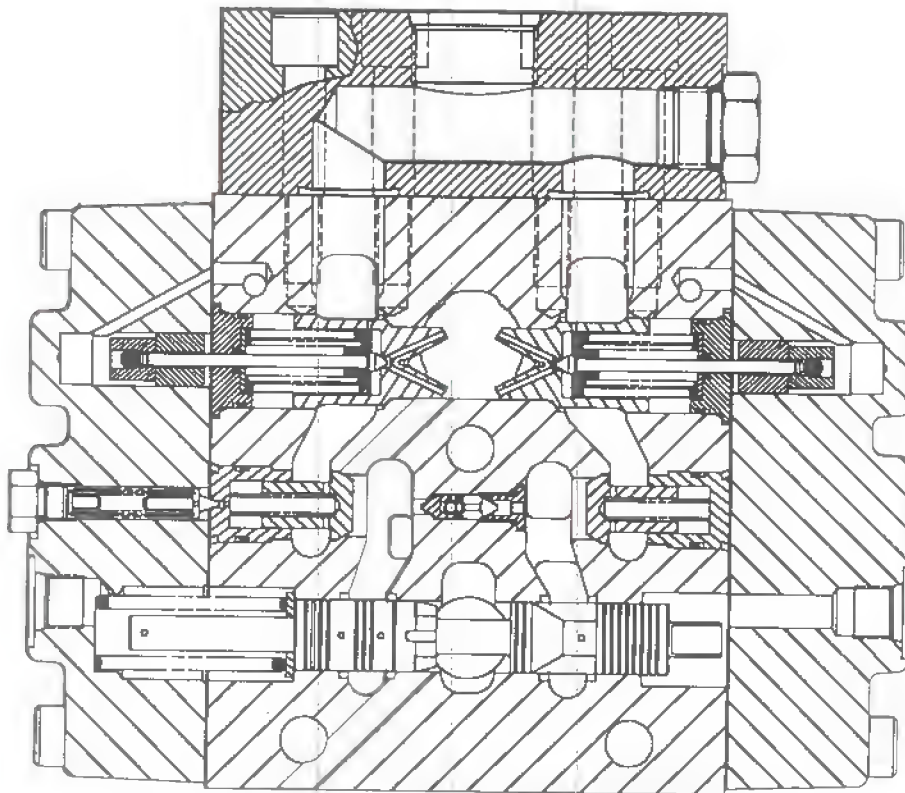


Figure 44

**CMX SINGLE ACTING M/I FLOW VS. COMMAND
AT 20 BAR P-LS PRESSURE DIFFERENTIAL**

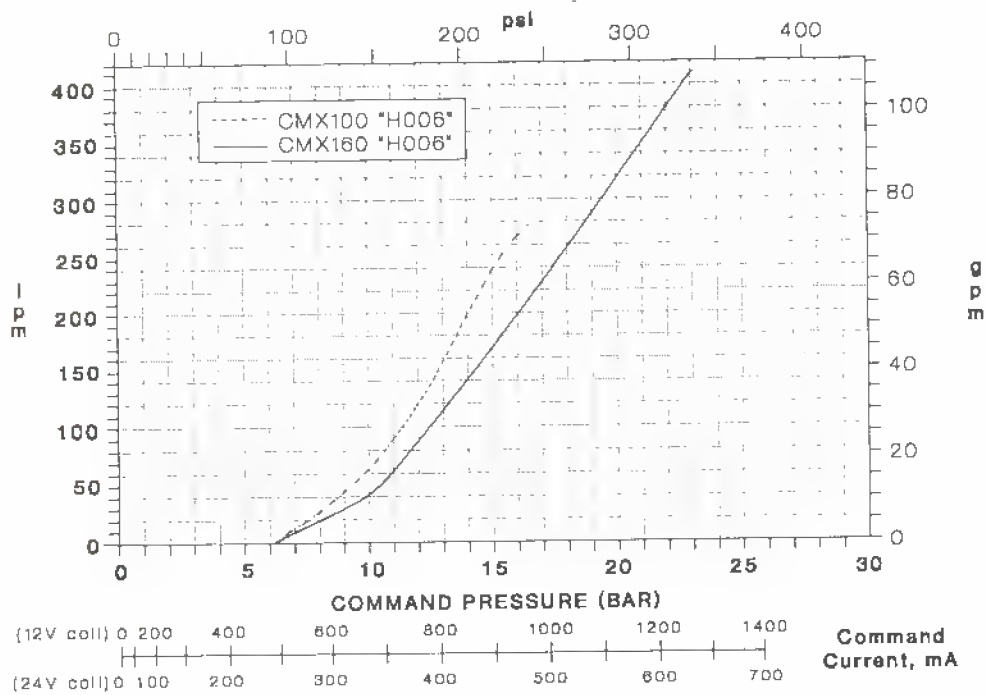


Figure 45a

**CMX100 SINGLE ACTING METER-IN ELEMENT
PRESSURE COMPENSATION
Model 'H006' Meter-In Element**

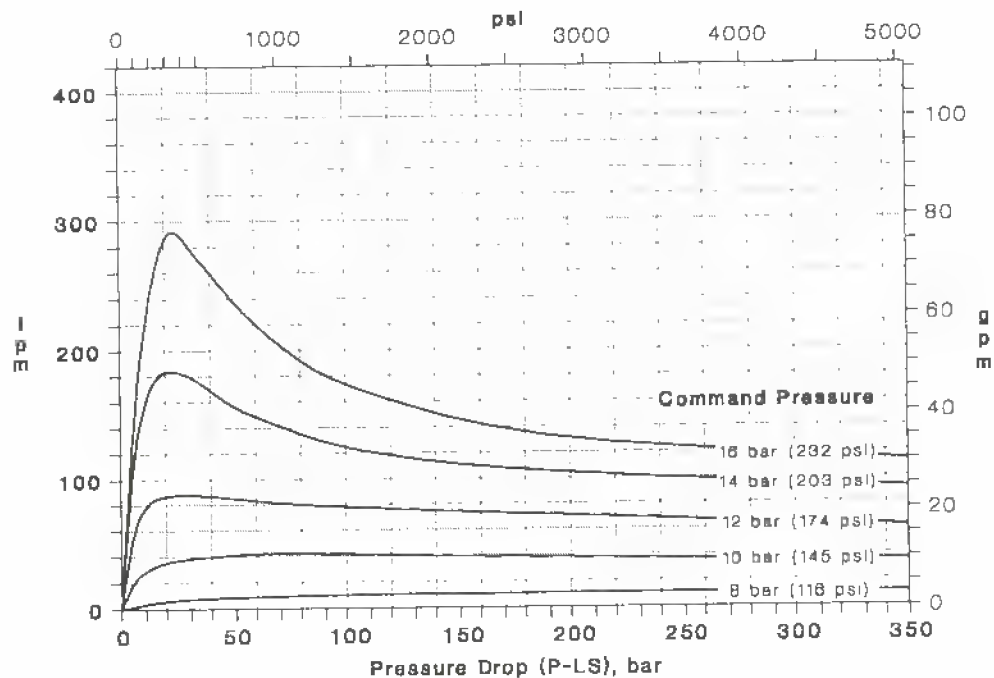


Figure 45b

**CMX160 SINGLE ACTING METER-IN ELEMENT
PRESSURE COMPENSATION**
Model "H006" Meter-In Element

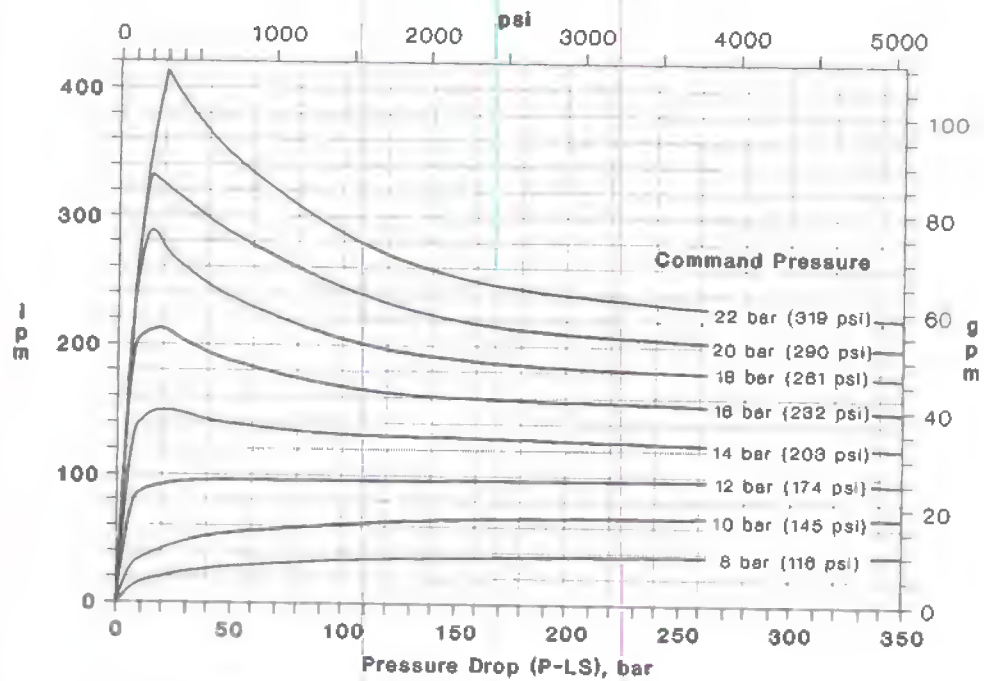


Figure 45c

Swing drive with pressure controlled braking

This feature provides meter-in pressure control, proportional pressure controlled braking through the command pressure system, and blocked actuator ports in neutral. To achieve proportional braking, the meter-out element is operated only by

a special relief valve pilot circuit (Figure 46). The relief valve setting is controlled by the command pressure, which is accomplished by a piston that is acted upon by command pressure to oppose the spring load on the relief valve poppet. As the command pressure increases, the actuator port pressure required to open the relief

valve poppet decreases, effectively decreasing the relief valve setting. Thus when driving a load, the relief valve setting is at a minimum, typically about 8 bar (116 psi). To brake the load, the pilot pressure is decreased, which increases the relief valve setting. The pilot pressure is decreased until the desired braking pressure is achieved.

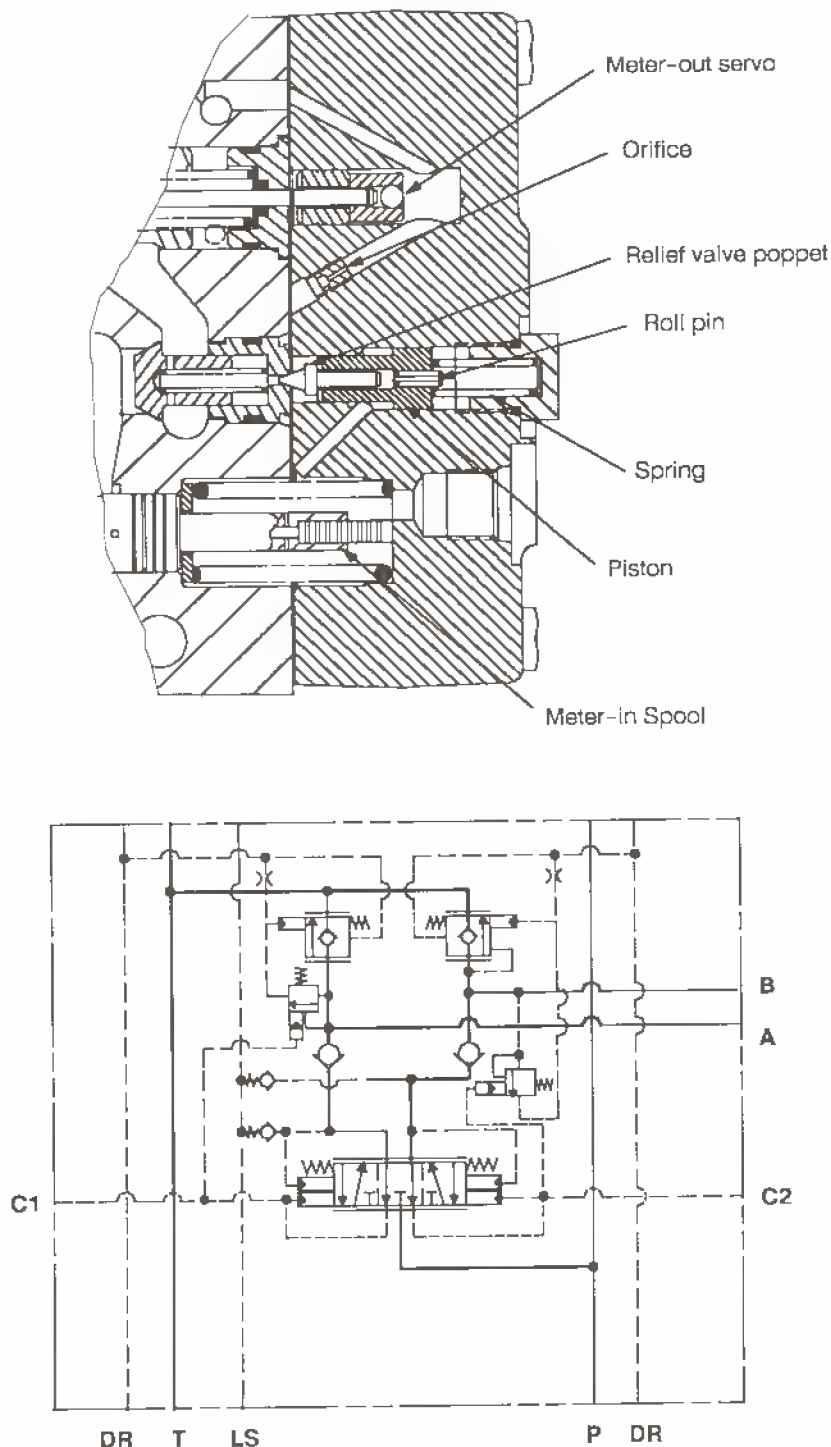


Figure 46

Performance characteristics of the meter-out pressure control valve can be plotted using Q-P diagrams. Figure 47a is the Q-P diagram for the CMX100 "S406" meter-in spool from page 18. Figure 47b is the Q-P (relief valve override) diagram of the "P03" relief valve for various command pressures and a relief valve setting of 208 bar. Combining these diagrams yields Figure 47c (See Figure 47e for CMX160 version). Note that the back pressure from the opposite actuator port relief valve has been subtracted from the constant-pilot-pressure lines, so the pressure scale is the pressure drop across the valve's actuator ports. Now, for a given flow and command pressure, the pressure available to drive or brake the load can be extracted. If an assumed steady state load curve is added (Figure 47d), the chart can be used to determine the required

command pressure to drive the load at a given speed; or, the equivalent braking pressure (braking pressure plus the load curve) can be obtained.

To illustrate the operation of the valve, assume the load is at rest and the valve is in neutral. The figure shows a braking pressure of 185 bar at point A, which is the relief valve setting, and the pressure that must be imposed by an external load to move the load. As pilot pressure is applied, pressure begins to be applied to the actuator at point B. When the load pressure is overcome at point C, the load begins to move. If the pilot pressure is increased to 20 bar, the load will accelerate along the 20 bar pilot pressure line until the output pressure equals the steady-state load pressure at point E. Note that the pressure available to accelerate the load is the output pressure at any given

flow and pilot pressure minus the steady state load pressure.

To slow or stop the load, the command pressure is reduced. If the command pressure is reduced to 16 bar (point F), the load will continue to be driven but at a pressure below the steady-state load curve. The load will slow along the 16 bar line until the steady state load curve is intersected at G point. If the command pressure is further reduced to 8 bar, the load will brake until the load stops. Here, the effective deceleration pressure at any given speed is the braking pressure plus the steady-state load pressure.

By modulating the command signal, the operator has complete proportional control of swing driving and braking pressures. This control provides smooth, precise control of high inertia swing drives.

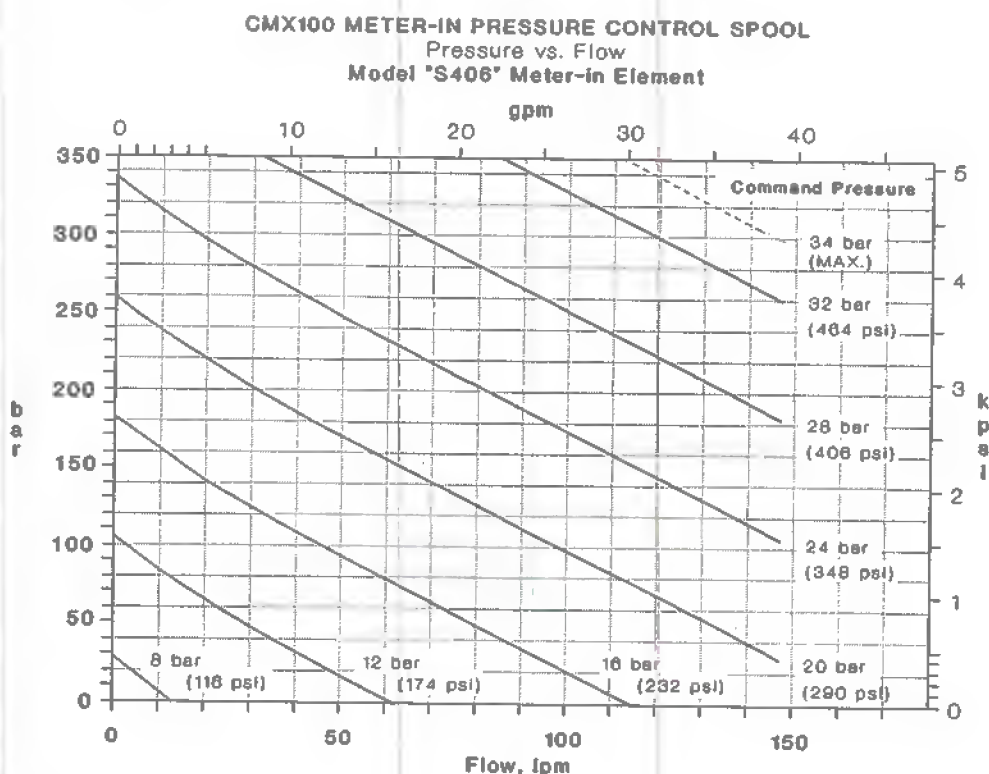


Figure 47a

CMX100 METER-OUT PRESSURE CONTROL
MODEL "P03" RELIEF VALVE OVERRIDE

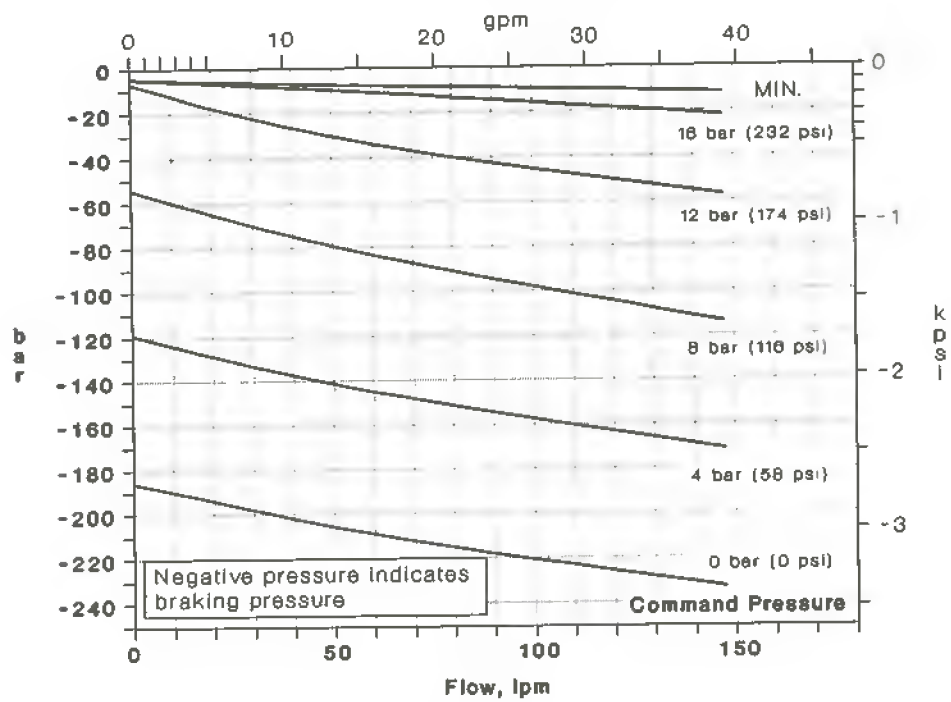


Figure 47b

CMX100 PRESSURE CONTROL VALVE

Pressure vs. Flow

Model "S406-P03"

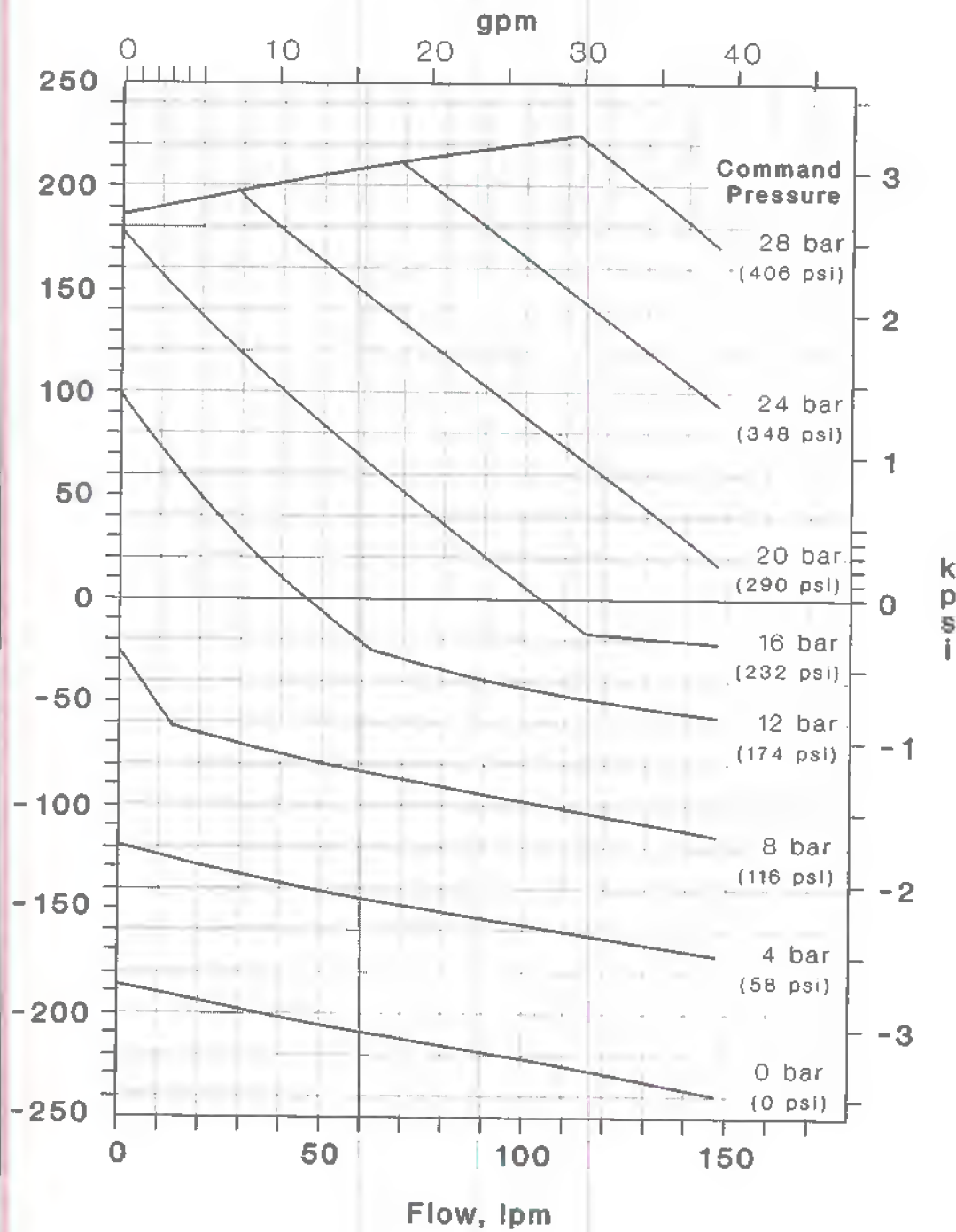


Figure 47c

CMX100 PRESSURE CONTROL VALVE

Pressure vs. Flow

Model "S406-P03"

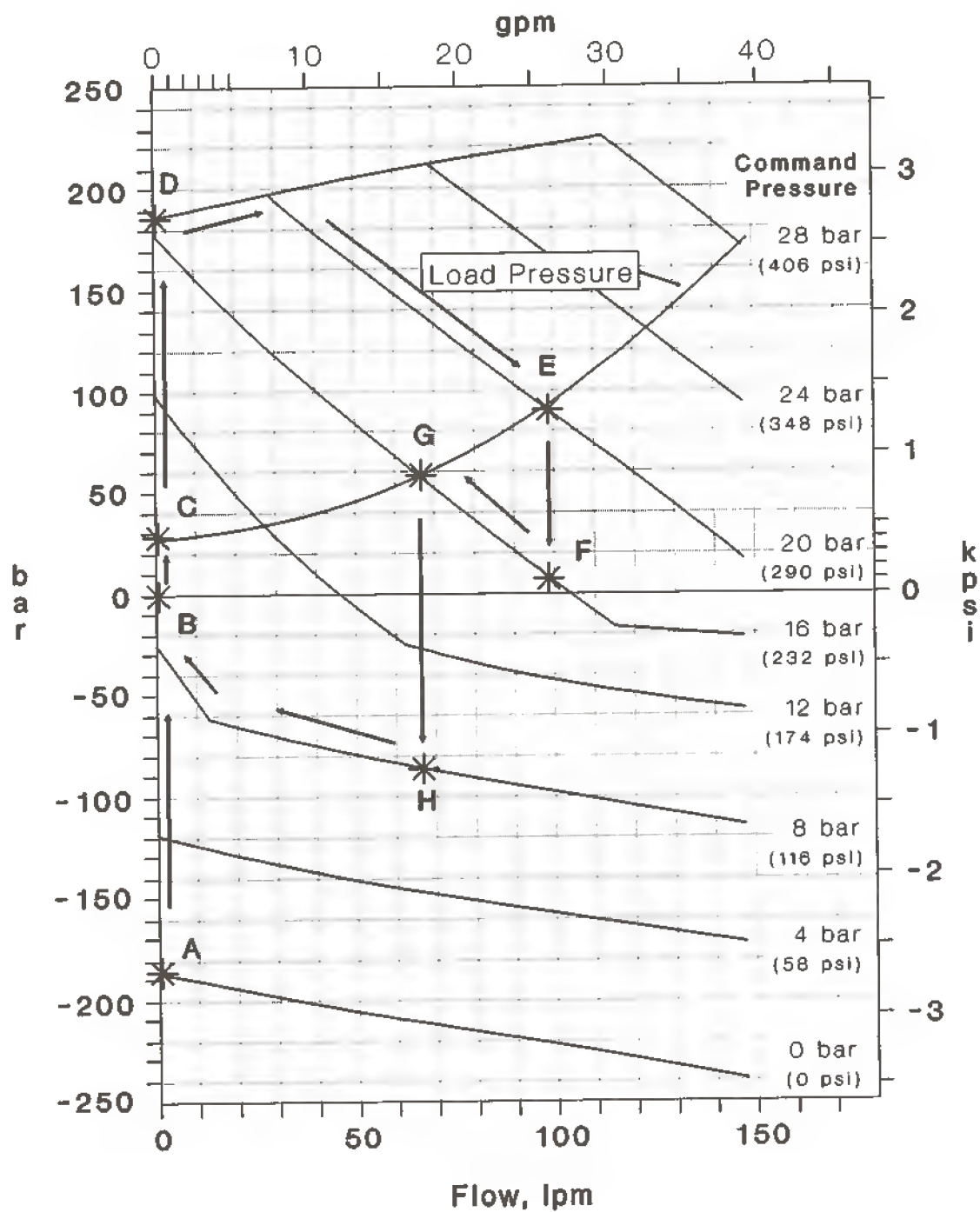


Figure 47d

CMX160 PRESSURE CONTROL VALVE
 Pressure vs. Flow
 Model "S506-P04"

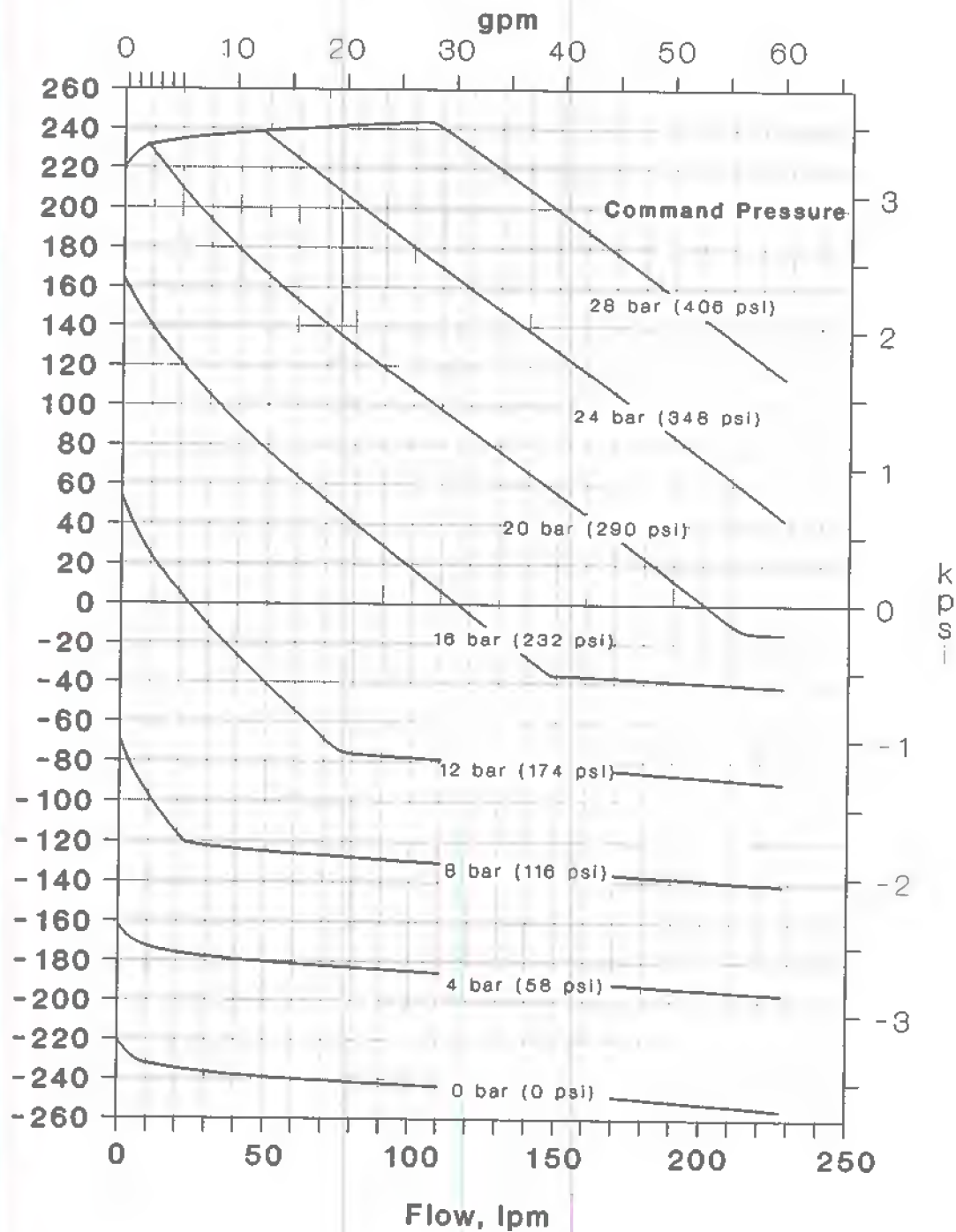


Figure 47e

Free coast (type "F" meter-out)

This option provides a free coast or float operation in neutral. (Note: On a standard valve, float operation can be achieved by piloting both pilot pressure ports simultaneously). This is accomplished by a passage between

the meter-out spring chamber and the corresponding meter-in chamber (Figure 48). In neutral, pressure in the meter-in chamber is low; thus, the meter-out spring chamber pressure is low, and the meter-out poppet will open when the relatively light spring force of the meter-out servo stem is overcome. During commanded

operation, a check valve prevents flow from the meter-in chamber to the meter-out spring chamber. Single "F" meter-out models hold the load in one direction but not the other. The FA and FB models hold the load in one direction but not the other. Dual "F" meter-out models give a free coast or float feature in both directions.

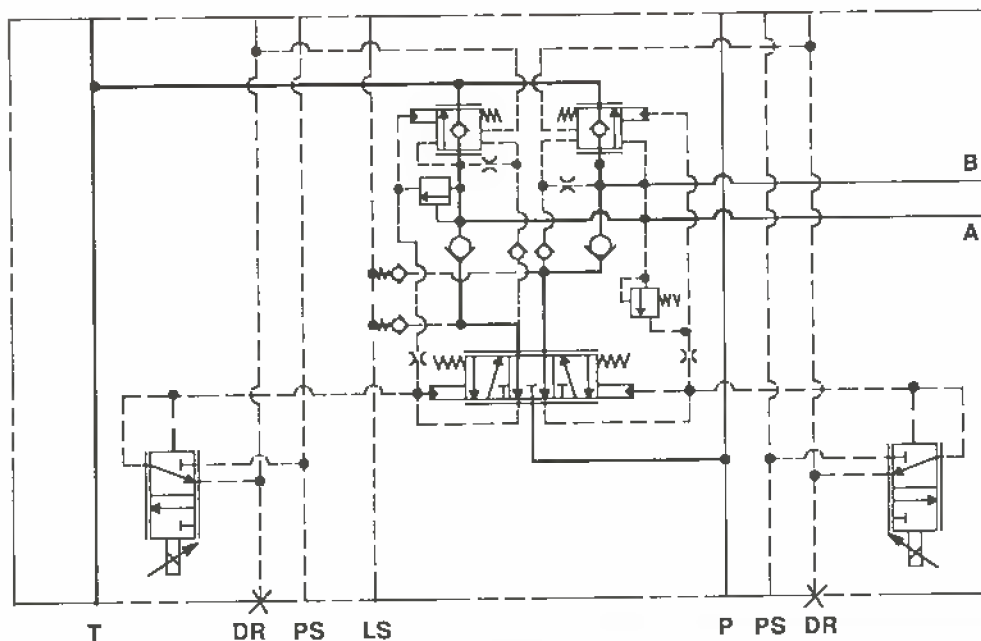
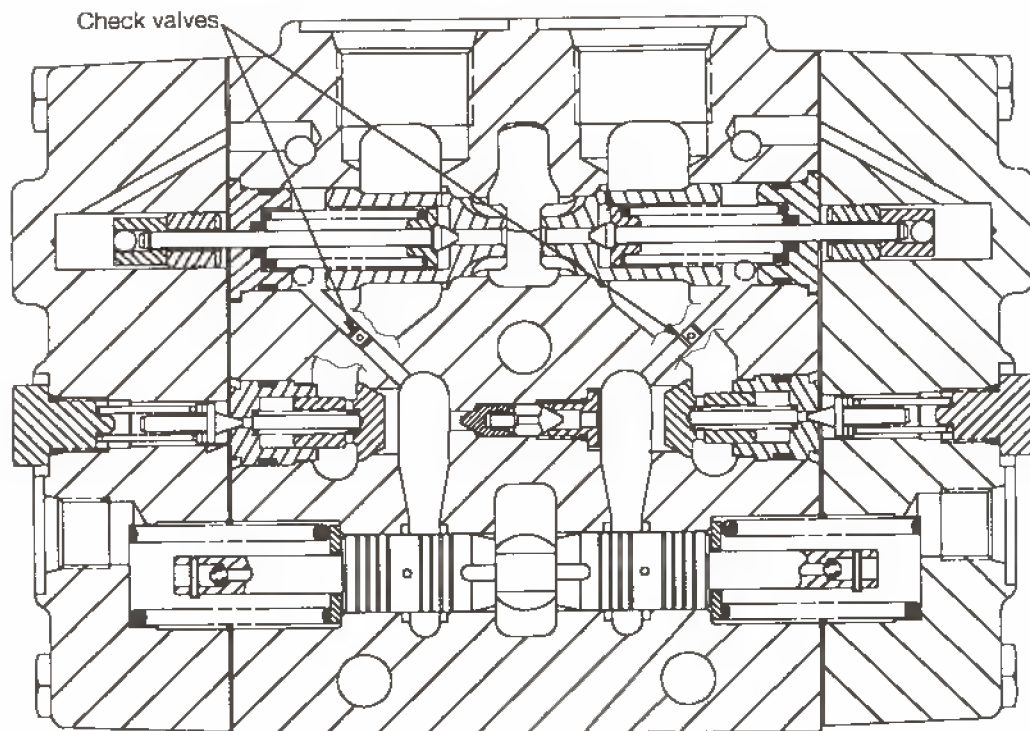


Figure 48

CMX100 FREE COAST PERFORMANCE

F03 Meter-out Poppet

Flow vs. Pressure Differential

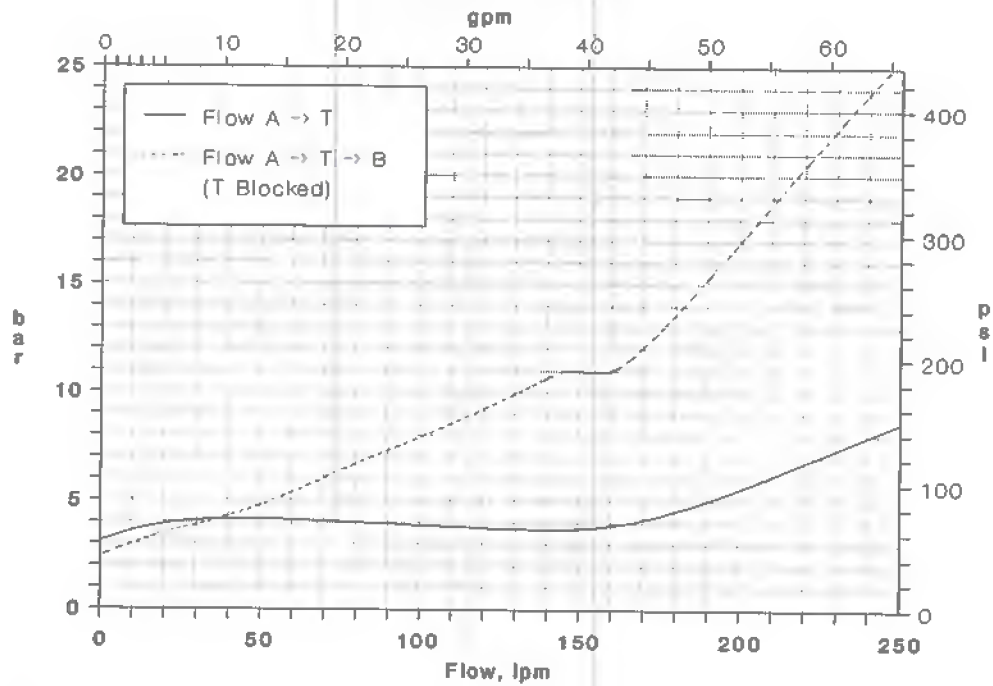


Figure 49

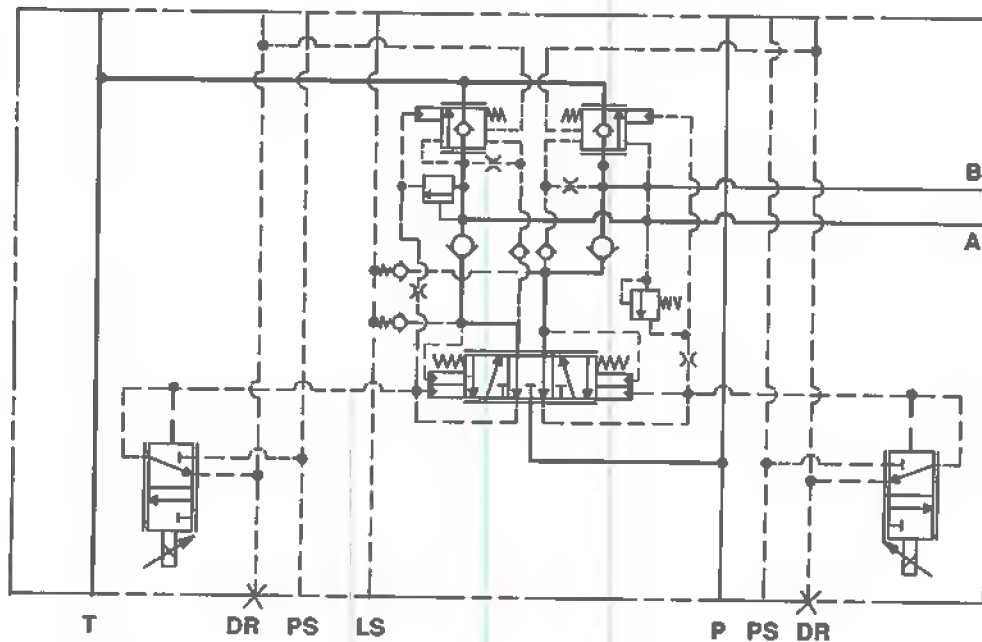
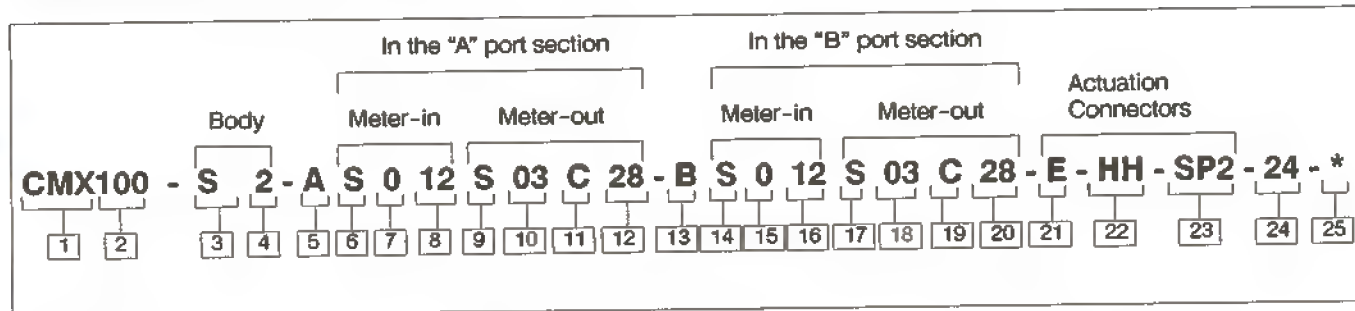


Figure 50. Swing Drive With Free Coast
(Utilizing meter-out poppets and a pressure controlling meter-in element.)

CMX Sectional Model Code



1 Mobile valve

Load sensing
Pressure compensated

2 Valve series

100 - 100 l/min
160 - 160 l/min

3 Port configuration

S - Thd. port SAE o-ring connection
F - Flanged port Code 62
SAE 4-bolt high pressure
FL - Flanged port Code 61
SAE 4-bolt standard pressure

4 Construction

2 - Sectional
3 - Sectional with module
(requires **F** or **FL** ports)

5 Port designation "A"

6 Meter-in function

H - Single acting high flow
L - Low flow 0 - 40 l/min (11 USgpm)
S - Standard

Note: When meter-in spool drain orifice is required, add "D" to model code in this position.

6A P

Meter-in pressure limitation.
Omit if not required.

7 Pressure feedback pin diameter

0 - No pin (Flow control)
2 - 2.0 mm
4 - 3.6 mm (Pressure control)
5 - 4.5 mm

8 Meter-in cracking pressure

06 - 6.3 bar
12 - 11.6 bar

9 Meter-out function

S - Standard
V - External vent
F - Free coast
P - Pressure control
(must have external drain)
M - Meter-out spool - fully open to tank in neutral
N - Meter-out spool - restricted opening to tank in neutral

10 Meter-out element

(Δp at rated flow)
00 - Meter-out spool
03 - 3 bar CMX100 only
04 - 4 bar CMX160 only
07 - 7 bar CMX160 only
14 - 14 bar CMX100 & 160
56 - 56 bar CMX160 only
90 - 90 bar CMX100 only

11 Meter-out special features

(Omit if not required)

A - Anti-cavitation valve T ∇ A
B - Anti-cavitation valve T ∇ B
C - Anti-cavitation valve T ∇ AB
H - High flow module A port
R - Regenerative module A ∇ B
T - Regenerative module B ∇ A

12 Meter-out pressure limitation

00 - Without pilot relief valve
10 - 38 - Consecutive numbers representing 100 bar (1450 psi) to 380 bar (5510 psi) in increments of 10 bar (150 psi), eg. 14 - 140 bar
99 - Externally adjustable relief

13 Port designation "B"

Repeat positions 6 through 12 for B port positions 14 through 20.

21 Actuation

E - Electrohydraulic
H - Hydraulic
(must have external drain)

22 Voltage

(Electrohydraulic only.
Blank not required for hydraulic actuation)

G - 12 volts DC
H - 24 volts DC
HH - 28 volts DC

23 Electrical connectors

FL - Flying leads
SP2 - Dual SAE 1/4" spade connector
U - DIN 43650 spade plug only
U1 - DIN 43650 complete
MP - Metri-pack

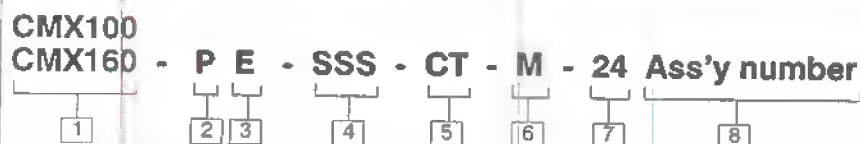
24 Design number

25 Assembly number

Assigned by Engineering

Check with your local Vickers representative for availability of the features shown in italics.

CMX Sectional Valve Bank Model Code



1 Valve series

2 Inlet

Standard inlet

- P - CMX100 .750" SAE
Standard Straight thread
P - CMX160 1.000" SAE 4-bolt
Standard "S2" flange, Code 61
P1- CMX160 .750" SAE 4-bolt
Standard "F2" flange, Code 62

Mid-inlet

- MS* CMX160/100 1.250" SAE 4-bolt
mid-inlet "S2" flange, Code 61
MF* Mid-inlet "F2" 1.250" SAE 4-bolt
flange, Code 62

M*1 Mid-inlet with pressure reducing
valve. Omit if not required.

M*2 Mid-inlet with make up flow valve
(anti-cavitation module). Omit if
not required

M*3 Mid-inlet with pressure reducing
and make up flow valve. Omit if
not required

NOTE: When mid-inlet is required, add
the mid-inlet designation at the
appropriate place in the model code.
Two end covers are required when a
mid inlet is specified.

Load sense inlet

- L - CMX100 only .750" SAE
Load sensing straight thread

- ** - Load sensing pressure
differential
10 bar
16 bar
26 bar

When unloading solenoid valve is re-
quired, add one of the following:

- "G" 12 volt DC (flying leads only)
"H" 24 volt DC (flying leads only)

Note: Maximum limiting relief pressure:
210 bar.

Add "N" when unloading valve is not
required.

- ** - Limiting relief pressure; 10 to
250 bar (Code 01 to 25)

Example: Unit with L/S inlet L16G15

3 External pilot supply

Omit if not required

4 Section

One required for each section, up to
eight sections (Refer to sectional
model code for description)

5 End cover

- C - Cover with no L/S orifice (solid plug)
F - With fixed L/S orifice 0.5mm (0.020")
D - With load sense decompression
valve

- P - Auxiliary P port
T - Auxiliary T port
S - Auxiliary P and T ports

NOTE: Two end covers are required
when mid-inlet is specified)

6 Mounting holes

M - Metric threads
Omit for inch threads.

Thread size inch

CMX100 - 3 holes .4375 - 14 UNC-2B
CMX160 - 3 holes .5000 - 13UNC-2B

Thread size metric

CMX100 - 3 holes M10 - 1.5
CMX160 - 3 holes M12 - 1.75

7 Design number

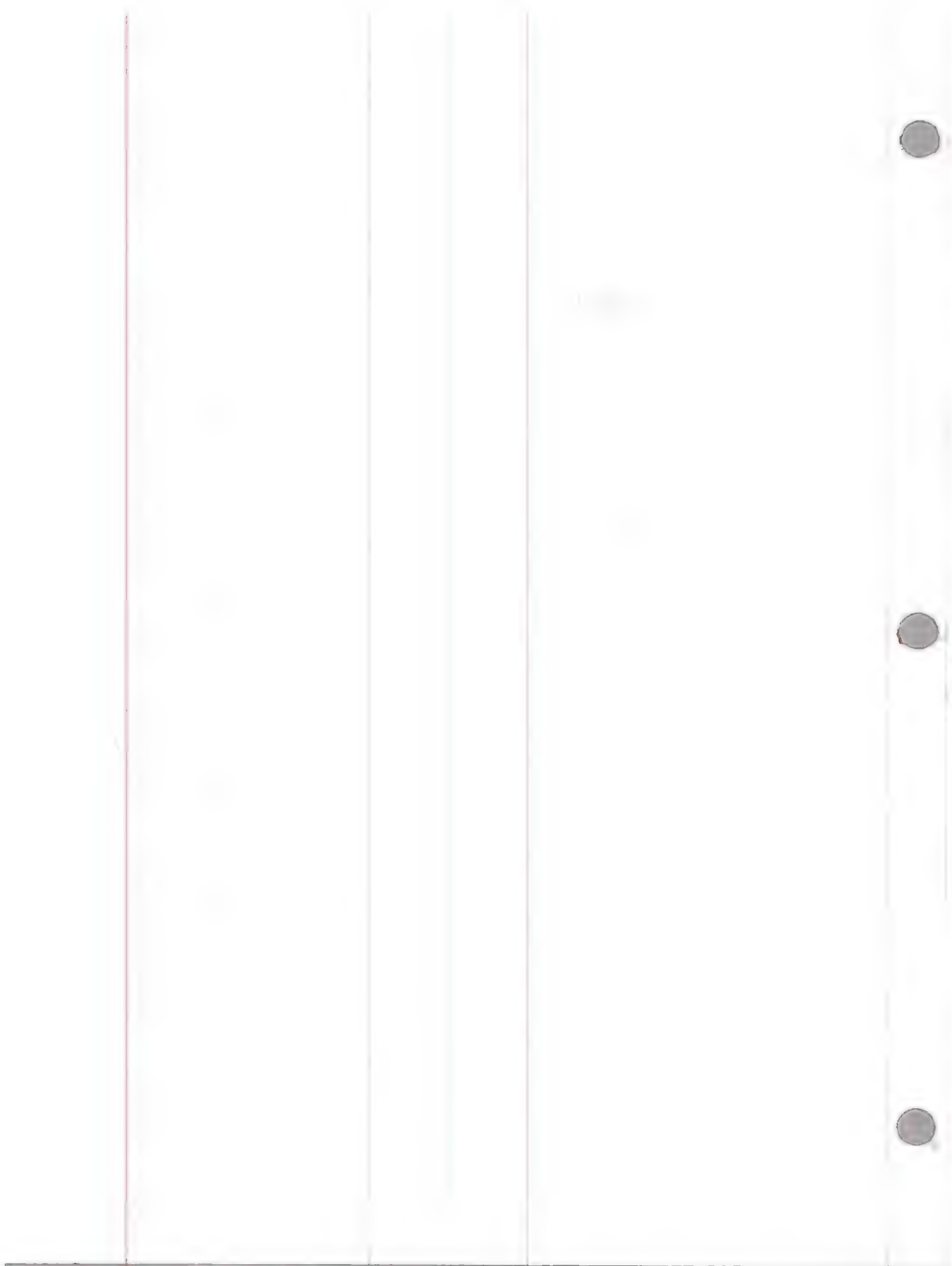
8 Assembly number

Assigned by Engineering

PORT SIZES

Model	Pressure "P"	Tank "T"	Actuator "A" & "B"	Load Sense "LS"	Ext. Pilot "XP"
CMX100 "S2"	.750" SAE straight thread O-ring boss (1.063-12 UN-2B thd)	1.000" SAE straight thread O-ring boss (1.313-12 UN-2B thd)	1.062-12SAE straight thread O-ring	.375" SAE straight thread O-ring boss (.563-18 UNF-2B thd)	.375" SAE straight thread O-ring boss (.563-18 UNF-2B thd)
CMX100 "F2"	12.7 (.50) dia. SAE 4-bolt flange Code 62	19.0 (.75) dia. SAE 4-bolt flange Code 61	12.7 (.50) dia. SAE 4-bolt flange Code 62	.375" SAE straight thread O-ring boss (.563-18 UNF-2B thd)	.375" SAE straight thread O-ring boss (.563-18 UNF-2B thd)
CMX100 "FL2"	12.7 (.50) dia. SAE 4-bolt flange Code 61	19.0 (.75) dia. SAE 4-bolt flange Code 61	12.7 (.50) dia. SAE 4-bolt flange Code 61	.375" SAE straight thread O-ring boss (.563-18 UNF-2B thd)	.375" SAE straight thread O-ring boss (.563-18 UNF-2B thd)
CMX160 "S2"	1.000" SAE 4-bolt flange Code 61	1.250" SAE 4-bolt flange Code 61	1.312-12 SAE straight thd. O-ring	.375" SAE straight thread O-ring boss (.563-18 UNF-2B thd)	.375" SAE straight thread O-ring boss (.563-18 UNF-2B thd)
CMX160 "F2"	.750" SAE 4-bolt flange Code 62	1.250" SAE 4-bolt flange Code 61	19 (.75) dia. SAE 4-bolt flange Code 62	.375" SAE straight thread O-ring boss (.563-18 UNF-2B thd)	.375" SAE straight thread O-ring boss (.563-18 UNF-2B thd)
CMX160 "FL2"	.750" SAE 4-bolt flange Code 61	1.250" SAE 4-bolt flange Code 61	19 (.75) dia. SAE 4-bolt flange Code 61	.375" SAE straight thread O-ring boss (.563-18 UNF-2B thd)	.375" SAE straight thread O-ring boss (.563-18 UNF-2B thd)
CMX100 Load sensing relief valve	.750" SAE straight thread O-ring boss (1.063-12 UN-2B thd)	1.000" SAE straight thread O-ring boss (1.313-12 UN-2B thd)		.375" SAE straight thread O-ring boss (.563-18 UNF-2B thd)	.375" SAE straight thread O-ring boss (.563-18 UNF-2B thd)
CMX160/CMX100 Mid-inlet "S2"	1.250" SAE 4-bolt flange Code 61	1.500" SAE 4-bolt flange Code 61		.375" SAE straight thread O-ring boss (.563-18 UNF-2B thd)	.375" SAE straight thread O-ring boss (.563-18 UNF-2B thd)
Mid-inlet "F2"	1.250" SAE 4-bolt flange Code 62	1.500" SAE 4-bolt flange Code 61	1.250" SAE 4-bolt flange Code 62	.375" SAE straight thread O-ring boss (.563-18 UNF-2B thd)	.375" SAE straight thread O-ring boss (.563-18 UNF-2B thd)
CMX160/CMX100 Mid-inlet with pilot supply and anti-cav. makeup	1.000" SAE straight thread O-ring boss (1.313-12 UN-2B thd)	1.500" SAE straight thread O-ring boss (1.875-12 UN-2B thd)		.375" SAE straight thread O-ring boss (.563-18 UNF-2B thd)	.375" SAE straight thread O-ring boss (.563-18 UNF-2B thd)

Deceleration, external drain and cooling ports:
CMX100 and 160 valves .5625-18 SAE straight thread, "O" ring.





Overhaul Manual

**Remote
Flow
Control
Valves**

FCGT-02-A-***-11-(S30)
FCGT-02-B-***-11-(S30)



Vickers, Incorporated

P.O. Box 302
Troy, Michigan 48007-0302

Revised 12-1-85

I-3419-S

TABLE OF CONTENTS

I INTRODUCTION

A. Purpose of Manual	1
B. General Information	1
1. Related Publications	1
2. Model Codes	1

II DESCRIPTION

A. General	2
B. Application	2

III PRINCIPLES OF OPERATION

A. Spool Adjustment	2
B. Theory of Operation	2

IV INSTALLATION AND OPERATING INSTRUCTIONS

A. Installation Drawing	3
B. Mounting	3
C. Piping and Tubing	3
D. Hydraulic Fluid Recommendations	3
E. Overload Protection	3

V SERVICE AND MAINTENANCE

A. Inspection	4
B. Adding Fluid to the System	4
C. Adjustments	4
D. Lubrication	4
E. Replacement Parts	4
F. Trouble Shooting	4

VI OVERHAUL

A. General	5
B. Special Tool	5
C. Improvised Tools	5
D. Disassembly	5
E. Inspection, Repair, and Replacement	5
F. Assembly	7

VII TEST PROCEDURE

A. Test Conditions	9
B. Test	9

Section I - INTRODUCTION

A. PURPOSE OF MANUAL

This manual describes the basic operational characteristics and provides service, overhaul and parts information for the Vickers FCGT-02 Electrically Modulated Flow Control. The information contained herein pertains to the latest design series as listed in Table 2.

B. GENERAL INFORMATION

1. Related Publications - Installation dimensions are not contained in this manual. The installation drawing listed in Table 1 is available from any Vickers application engineering office or from:

Vickers, Incorporated
Technical Publications
1401 Crooks Road
Troy, MI 48084

2. Model Codes - Variations within each basic model series are covered in the model code. Table 2 is a complete breakdown of the codes covering these units. Service inquiries should always include the complete unit model code as noted on the nameplate.

Model	Drawing
FCGT-02-A-004-11	513850A
FCGT-02-B-004-11	
FCGT-02-A-028-11	
FCGT-02-B-028-11	
FCGT-02-A-220-11	
FCGT-02-B-220-11	
FCGT-02-A-530-11	
FCGT-02-B-530-11	

Table 1.

MODEL CODE BREAKDOWN

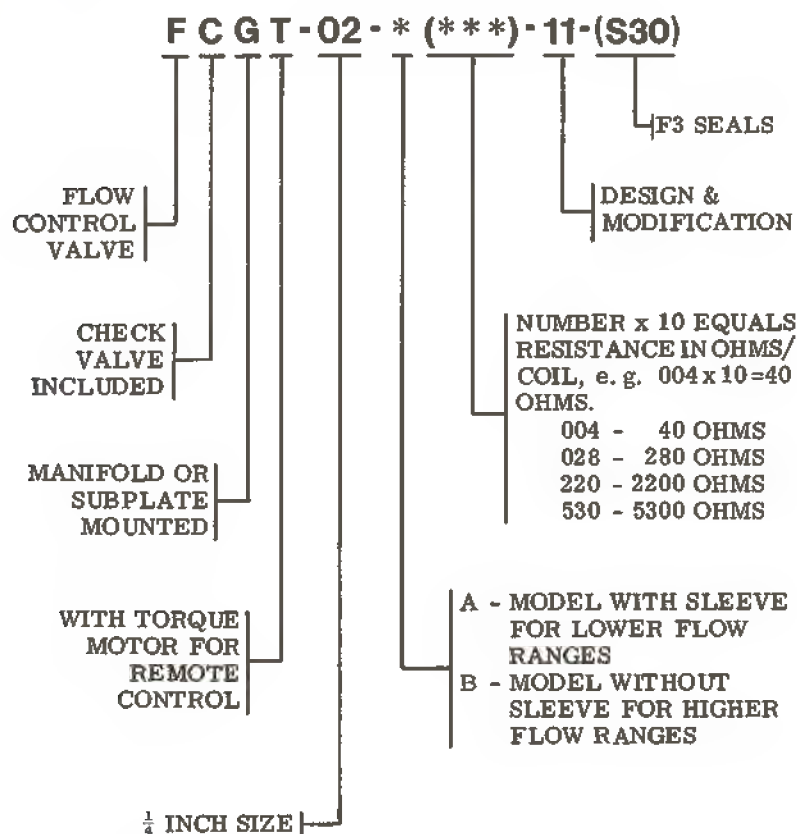


Table 2. Model Code Breakdown

Section II - DESCRIPTION

A. GENERAL.

Assembly of a typical FCGT Flow Control is shown in Figure 1. In general, the flow control consists of an electrical torque motor coupled to a metering spool. The metering spool and a compensated hydrostat stabilizes flow in the forward direction. A check valve is provided to allow reverse free flow through the valve.

FCGT flow controls are available in two flow ranges; 5 to 250 and 50 to 1000 cubic inches per minute, (in³/minute). Flow ranges are determined by different metering spool diameters. The smaller the metering spool, the lower the flow range.

B. APPLICATION

Vickers application engineering personnel should be consulted to determine correct methods of installation and applications.

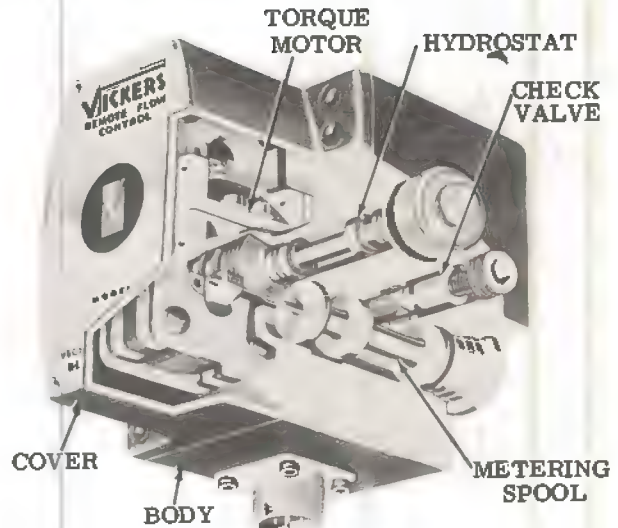


Figure 1. Cut Away View of FCGT-02-*-***-11

Section III - PRINCIPLES OF OPERATION

A. SPOOL ADJUSTMENT

The metering spool is adjusted at the factory for a minimum flow of 5 in³/minute, ('A' Models), and 50 in³/minute for 'B' models.

B. THEORY OF OPERATION

Consider the FCGT Flow Control Valve as being two distinct and separate systems - one a standard compensated flow control with a fixed throttle setting and secondly an electrically modulated device (torque motor), used to vary the throttle opening. (Refer to the pictorial diagram Figure 2, during the following explanation.)

FLOW CONTROLS - Flow controls work on the principle that flow through an orifice will be constant when the pressure drop across the orifice is held constant. Flow (Q) through an orifice is directly proportional to the orifice area (A) and the square root of the pressure drop across it, ($\sqrt{\Delta P}$).

$$Q = A \sqrt{\Delta P / 0.0325} \quad Q = \text{USGPM} \quad A = \text{in}^2$$

Valid for short orifice ΔP - PSI drop across orifice

Assume throttle orifice "A" (the metering spool orifice) is opened to allow 200 cubic inches/minute (in³/minute), flow through the valve to an external load circuit. The external load circuit develops 1000 PSI. Inlet pressure to the valve is 2000 PSI.

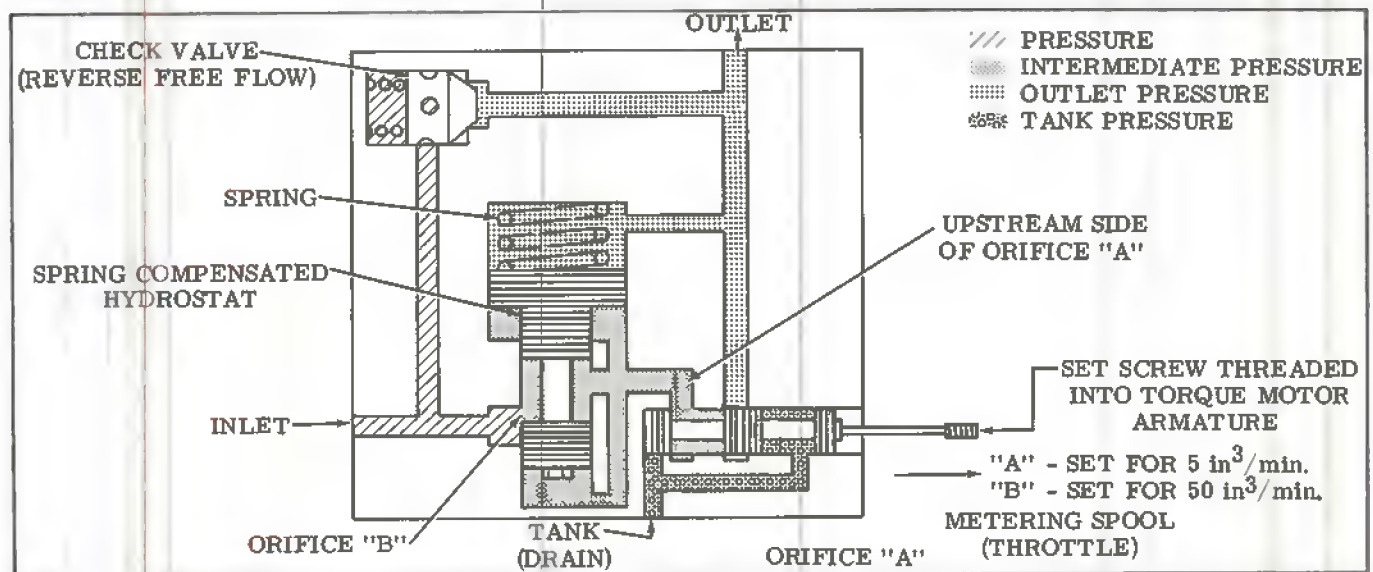


Figure 2. Pictorial Diagram

The total pressure drop across the valves two series orifices "A" and "B" must equal 1000 PSI, (the difference between inlet and outlet pressures). The normal drop across orifice "A" is between 60 and 80 PSI. (Use 75 PSI for this explanation.) Orifice "B" will drop 925 PSI, the total of the two pressure drops is the difference between inlet and outlet pressures.

If the work load increases, the outlet pressure increases. To keep a constant flow, the pressure drop across orifice "A" must not change. This is accomplished as follows:

The increased outlet pressure is sensed against the spring end of the hydrostat, causing it to move down, increasing the area of orifice "B" and reducing the pressure drop across it. This increases the pressure available at the up-stream side of orifice "A". 200 in³/minute will continue to flow as long as a 75 PSI pressure drop is maintained across orifice "A".

If the work load were to decrease, (output PSI lower), a similar set of events will begin, except in the opposite direction. The hydrostat will move up. Orifice "B" reduces in size, increasing the pressure drop across it, lowering the pressure at the up-stream side of orifice "A" and a constant 200 in³/minute will continue to flow through the valve.

TORQUE MOTOR - A high force permanent magnet torque motor imparts linear motion to the torque motor armature. The deflection of the armature is directly proportional to current through the torque motor coils. This armature is linked to the metering spool with a wire and set screw. When current is applied to the torque motor coils, the armature is deflected to a certain position and the metering spool follows, opening or closing orifice "A". When orifice "A" changes, the flow control will vary flow through the valve and hold it constant at the new setting of the metering spool regardless of workload.

Section IV - Installation and Operating Instructions

A. INSTALLATION DRAWINGS

The installation drawing listed in table 1 will show installation dimensions and port locations.

B. MOUNTING

The FCGT-02-*-11 Flow Control Valve is designed for manifold or subplate mounting. Refer to the installation drawing for subplate dimensions.

C. PIPING AND TUBING

1. All pipes and tubing must be thoroughly cleaned before installation. Recommended methods of cleaning are sand blasting, wire brushing and pickling.

NOTE

For instructions on pickling, refer to instruction sheet 1221-S.

2. To minimize flow resistance and the possibility of leakage, only as many fittings and connections as are necessary for proper installation should be used.

3. The number of bends in tubing should be kept to a minimum to prevent excessive turbulence and friction of oil flow. Tubing must not be bent too sharply. The recommended radius for bends is three times the outside diameter of the tube.

D. HYDRAULIC FLUID RECOMMENDATIONS

Oil in a hydraulic system performs the dual function of lubrication and transmission of power. It constitutes a vital factor in a hydraulic system, and careful selection should be made with the assistance of a reputable supplier. Proper selection of oil assures satisfactory life and operation of system components with particular emphasis on hydraulic valves.

Data sheet I-286-S for oil selection is available

from Vickers Technical Publications, Troy, MI. 48084.

Oil recommendations noted in the data sheet are based on our experience in industry as a hydraulic component manufacturer.

Where special considerations indicate a need to depart from the recommended oils or operating conditions, see your Vickers representative.

CLEANLINESS

Thorough precautions should always be observed to insure the hydraulic system is clean.

1. Clean (flush) entire new system to remove paint, metal chips, welding shot, etc.

2. Filter each change of oil to prevent introduction of contaminants into the system.

3. Provide continuous oil filtration to remove sludge, and products of wear and corrosion generated during the life of the system.

4. Provide continuous protection of system from entry of airborne contamination, by sealing the system and/or by proper filtration of the air.

5. During usage, proper oil filling and servicing of filters, breathers, reservoirs, etc., cannot be over emphasized.

6. Thorough precautions should be taken, by proper system and reservoir design, to insure that aeration of the oil will be kept to a minimum.

E. OVERLOAD PROTECTION

A relief valve is required to limit pressure in the system and to protect components from excessive pre-

ssure. The relief valve should be connected in the circuit at the outlet of the pump, before the FCGT flow control valve. The relief valve pressure setting should

be adjusted just above the minimum work requirements of the system. DO NOT exceed the pressure rating of any system component or a malfunction may result.

Section V - Service and Maintenance

A. INSPECTION

Periodic inspection of the fluid condition and tube or piping connections can save time-consuming breakdowns and unnecessary parts replacement. The following should be checked regularly:

1. All hydraulic connections must be kept tight. A loose connection in a pressure line will permit the fluid to leak out. If the fluid level becomes so low as to uncover the inlet pipe opening in the reservoir, extensive damage to system components can result. In suction or return lines, loose connections permit air to be drawn into the system resulting in noisy and/or erratic operation.

2. Clean fluid is the best insurance for long service life. Therefore, the reservoir should be checked periodically for dirt or other contaminants.

If fluid becomes contaminated, the system should be drained and the reservoir cleaned before new fluid is added.

3. Air bubbles in the reservoir can ruin system components. If bubbles are seen, locate the source of the air and seal the leak.

B. ADDING FLUID TO THE SYSTEM

When hydraulic fluid is added to replenish the sys-

tem, it should be pumped through a 10 micron (absolute) filter.

It is important that the fluid be clean and free of any substance which could cause improper operation or wear.

C. ADJUSTMENTS

See Test Procedure - Section VII.

D. LUBRICATION

Internal lubrication is provided by the fluid in the system.

E. REPLACEMENT PARTS

Reliable operation through the specified operating range is assured only if genuine Vickers parts are used. Sophisticated design processes and materials are used in the manufacture of our parts. Substitutions may result in early failure. Part numbers are shown in the parts listing - reference figure 3.

F. TROUBLE SHOOTING

Table 3 lists the common difficulties experienced with FCGT electrically modulated flow control valves. It also indicates probable causes and remedies for each of the troubles listed.

TROUBLE SHOOTING GUIDE		
TROUBLE	PROBABLE CAUSE	REMEDY
External Leakage	Back pressure in drain line and/or defective seals.	Drain directly to reservoir. Replace seals.
Stiction	Contamination and/or metering spool misalignment. Insufficient dither.	Clean valve. See alignment noted in test procedure Section VII.
Feed Rate Variations	Hydrostatic pressure compensator inoperative and/or sticking hydrostat.	Clean valve and flush system. Polish hydrostat and metering spool or replace with new parts.
Maximum Flow Not Obtainable	Contaminants in throttling orifice. Metering spool binding and not shifting fully or insufficient voltage to torque motor.	Clean valve. Check torque motor coils and input current. Realignment may be necessary. If this does not correct trouble, valve should be returned to Sperry Vickers for overhaul.
Check Valve Inoperative	Dirt lodged between mating faces, or finish faces scored.	Disassemble and flush thoroughly. Check filter element. Filter bypass may be open.

Table 3. Troubleshooting Chart

A. GENERAL

CAUTION

Before breaking a circuit connection, make certain that power is off and system pressure has been released. Lower all vertical cylinders, discharge accumulators, and block any load whose movement could generate pressure.

Drain oil from the hydraulic system. Use new, clean, filtered oil when restoring the unit to service. Clean the outside of the unit thoroughly to prevent entry of dirt into the system. After removing the valve and before disassembly, cap or plug all ports and disconnected hydraulic lines.

CAUTION

Absolute cleanliness is essential when working on a hydraulic system. Always work in a clean area. The presence of dirt and foreign materials in the system can result in serious damage or inadequate operation.

B. SPECIAL TOOLS

The following special tools are required:

1. Test stand mounting plate model FGTM-02-10 subplate and one BKFCGT-02-644 bolt kit.
2. Power supply rated at: Input 115 AC 50/60 Hz, Output 0-300 DC mA. Vickers EMCS-P-30 power supply part number 631995.
3. Milliammeter rated at 0-500 mA.
4. Test stand capable of providing the required hydraulic flow. See figure 6 located in Section VII, Test Procedure.
5. Pencil type solder iron and rosin core solder.
6. Volt - Ohm meter (VOM).
7. 5 inch "C" clamp.

C. IMPROVISED TOOLS.

No improvised tools are required for overhaul.

D. DISASSEMBLY.

Periodic maintenance of the valve will generally not require disassembly to the extent described here. However, the sequence can also be used as a guide for partial disassembly. In general, disassembly is accomplished in the item number sequence shown in figure 3. Special procedures are included in the following steps:

NOTE

Discard and replace all "O" rings removed during disassembly.

1. Prepare a clean lint free surface on which to lay internal parts of the valve.
2. Remove and discard "O" rings (1) and (2).
3. Remove four screws (3) from the electrical connector (4) and allow the connector to hang down on its wires.
4. Symbolize each wire with a piece of tape to allow reassembly to the same pin of the connector. Unsolder the four wires from connector (4). Remove connector and gasket (5).

NOTE

Hold the valve over a container during the following step. The cover is full of system fluid that can leak out during cover removal.

5. Remove four screws (6) and cover (7). This exposes torque motor assembly (10). Use a 0.05 inch hex key to thread metering spool adjustment screw from the torque motor armature nut.
6. Remove four screws (8) and washers (9) from torque motor assembly (10) and remove torque motor from valve body (30). Set the torque motor on the clean prepared surface. Remove metering spool (12) from body (30). Be careful not to stress or bend the wire. Lift spacer (11) and gasket (13) from valve. Discard gasket.

NOTE

Parts (14) and (15) are used only on FCGT-02-A-***-11 models. Do not remove from body of valve at this time.

7. Apply pressure to center of retainer (17) with a "C" clamp and remove snap ring (16) with a sharp screwdriver.
8. Remove parts (17) through (20) from valve body (30).
9. Apply pressure to center of retainer (22) and remove snap ring (21) with a sharp screwdriver.
10. Remove retainer (22) then separate "O" ring (23) from retainer. Discard "O" ring.
11. Remove parts (24) through (26). DO NOT remove seat (27) at this time.

E. INSPECTION, REPAIR, AND REPLACEMENT.

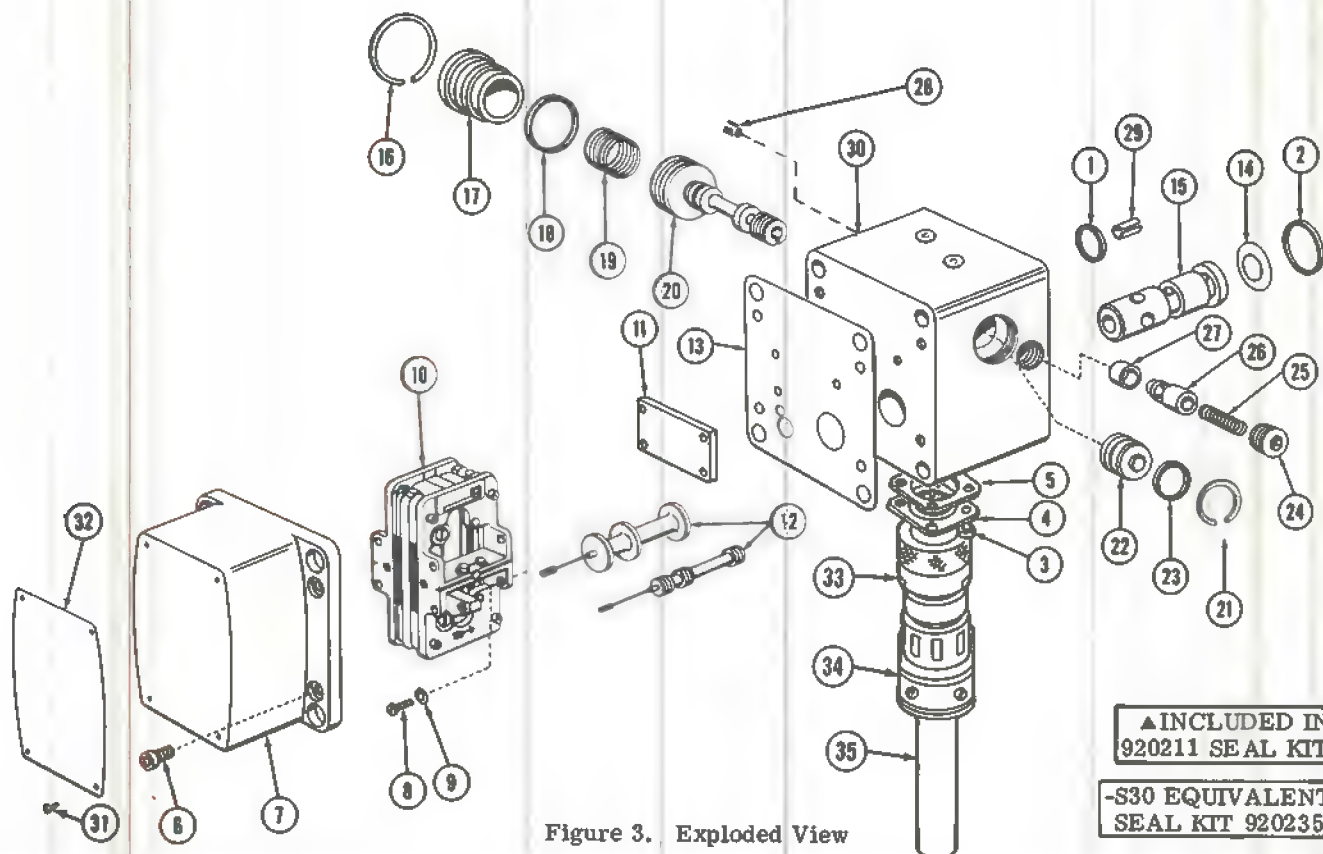


Figure 3. Exploded View

DESCRIPTION SOURCE CODE

FCGT-02-A-004-11-(S30)
FCGT-02-A-028-11-(S30)
FCGT-02-A-220-11-(S30)
FCGT-02-A-530-11-(S30)
FCGT-02-B-004-11-(S30)
FCGT-02-B-028-11-(S30)
FCGT-02-B-220-11-(S30)
FCGT-02-B-530-11-(S30)

A
B
C
D
E
F
G
H

NOTE

When Usable On Code is blank, the part is used on all models tabulated in source code. When Usable on codes are listed, use with indicated models only.

IND NO. X	PART NUMBER	DESCRIPTION	Qty	Use on CODE	IND NO. X	PART NUMBER	DESCRIPTION	Qty	Use on CODE
1	▲ 154011	"O" Ring	2		16	233625	Retaining Ring	1	
2	▲ 166772	"O" Ring	1		17	234939	Retainer	1	
3	179263	Screw	4		18	▲ 166772	"O" Ring	1	
4	243233	Elect. Connector	1		19	234964	Spring	1	
5	▲ 235068	Gasket	1		20	224342	Hydrostat	1	
6	7889	Screw	4		21	312382	Retaining Ring	1	
7	234484	Cover	1		22	317922	Retainer	1	
8	125792	Screw	4		23	▲ 153950	"O" Ring	1	
9	176021	Lockwasher	4		24	7076	Plug	1	
10	207961	Torque Mtr. (280 Ohms)	1	BF	25	95633	Spring	1	
	207692	Torque Mtr. (2200 Ohms)	1	CG	26	79795	Check Valve	1	
	211458	Torque Mtr. (5300 Ohms)	1	DH	27	239034	Seat	1	
	212619	Torque Mtr. (40 Ohms)	1	AE	28	7074	Plug (Aux. Drain Port)	1	
11	234483	Spacer	1		29	160571	Pin	1	
12	234485	Spool, Wire & Screw S/A	1	EFGH	30	328055	Body	1	
	238129	Spool, Wire & Screw S/A	1	ABCD	31	93489	Screw	4	
13	▲ 234478	Gasket	1		32	247278	Nameplate	1	
14	192435	Washer	1	ABCD	33	242123	Connector	1	
15	238127	Sleeve	1	ABCD	34	126058	Clamp	1	
					35	595310	Adapter	1	

NOTE

All parts must be thoroughly cleaned and kept clean during inspection and assembly. The close tolerance of the parts makes this requirement very important. Clean all removed parts, using a commercial solvent that is compatible with the system fluid. Compressed air may be used in cleaning, but it must be filtered to remove water and contamination. Clean compressed air is particularly useful in cleaning the spool and body passages. Replace all parts that do not meet the following specifications.

1. Inspect all components for excessive wear, erosion and/or seizure.
2. Inspect torque motor (10) for contamination (Ferrous wear particles binding the armature). Inspect torque motor coils for continuity (use the volt-ohm meter). Replace the torque motor if contaminated, or coils are open. DO NOT attempt repair of the torque motor.
3. Inspect metering spool (12) and hydrostat (20) for excessive wear, galling, erosion, and burrs. Remove burrs with an India stone. If either of the spools are defective, check body (30) bores for similar defects. Replace defective parts.
4. Inspect check valve (26) for excessive wear, erosion and burrs. The seat contact area of the valve should have a bright circular contact area. Leakage paths across the check valve will show up as a break in the bright circular area. Erosion of the seat area may also cause a leakage path to develop. If seat (27) requires removal, tap seat with an appropriate thread, then install a length of threaded drill rod into the seat. Remove seat from the valve body. See figure 4.

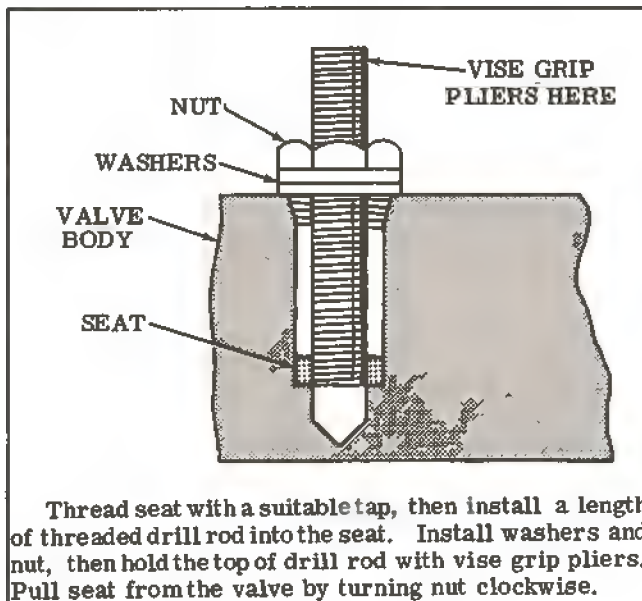


Figure 4. Removal of Seat

5. Inspect springs (19) and (25) for excessive wear and damaged coils. Replace springs if coils are damaged. Inspect springs for distortion. The ends of each spring must be parallel to each other. Replace springs if distorted.

6. Inspect body (30) for burrs, nicks, plugged passages and porosity. If either the metering spool, hydrostat or check valve are to be replaced, thoroughly inspect the bore from which the part was removed for defects. If the metering spool requires replacement, and the unit is a FCGT-02-A-11, remove and replace bushing (15) before installation of the new spool. Clean up bushing with an India stone before the spool is installed to remove the possibility of the existence of burrs. Burrs can prevent the bushing from entering the body and/or the metering spool from moving free within the sleeve. A very close slip fit exists between the body and sleeve, (0.0009 - 0.0012 inch). DO NOT force at assembly. If a problem exists, cool the sleeve before installation into the body. This reduces the diameter of the sleeve and will facilitate installation.

7. Inspect electrical connector (4) for solder splashes between pins, cross threads and broken pins. Replace if defective.

F. ASSEMBLY.

Replace the gaskets and "O" rings removed from the unit with those supplied in the seal kit. Lubricate "O" rings and parts using clean system fluid to facilitate assembly. Assemble parts in the reverse numerical sequence. Special procedures are included in the following steps: (See figure 3).

1. If nameplate (32) was removed, install a new nameplate with four screws (31).

2. Install parts (29) through (24) into body (30). If seat (27) or check valve (26) were defective, replace the check valve and seat as follows:

a. Press a new seat into the body (chamfer end of O.D. inward). Press seat in until it bottoms against the shoulder. Clean bore before installation of check valve to remove debris left from the seat installation.

b. Install a new check valve (26). The new check valve must be seated (matched to the seat) to prevent leakage. To seat a valve, first install valve into body without the spring. Insert a brass rod (smaller than the spring) behind the valve. Give the rod a sharp tap with a small hammer. This will seat the valve within the body. Remove the brass rod and valve. You will notice a circular pattern at the seat contact area of the valve. This pattern must not be broken or the valve will leak when put into service. Repeat the seating operation if required. Lubricate and assemble valve (26), then install spring (25) and plug together. Torque plug to 80 ± 5 lb. in.

NOTE

In the following step, hydrostat (20) must be installed with notch in small end parallel to mounting face of valve and pointing toward the electrical connector side of the valve body.

2. Install parts (23) through (16). Be careful not to cut "O" Rings during installation. Press plug (17) fully in with a large "C" clamp. This will facilitate assembly of retaining ring (16).

3. Position body (30) with mounting face down on the workbench. Lay gasket (13) and spacer (11) in position on the body. Lubricate and install metering spool (12) into body (30).

4. Position torque motor (10) against body (30), (wires to be located in wiring hole of body). Thread four screws (8) with lockwashers (9) through torque motor, spacer and gasket into body. DO NOT secure screws at this time.

5. Position torque motor armature above the metering spool adjustment screw. With a 0.05 inch hex head tool, thread the adjustment screw into the torque motor armature nut. (Alignment of the metering spool will be required along with the alignment of the torque motor during test.)

Pull the symbolized wires through the electrical connector opening as far as possible. If the torque motor was replaced, check the symbolization on the old motor to determine correct electrical connections. Refer to Table 4 and figure 5 if no connection information is available. Figure 5 will also help you determine the correct wiring for the different types of control systems used with torque motors. Table 5 defines

the input current required for a maximum armature deflection of 0.020 inch.

Torque Motor Coil Location	Color Code Versus Connector Pin	
	Red	Coded
COIL "A"	A	B
COIL "B"		
Coil located next to the armature connection nut	D	C

Table 4. Coil location and wiring code to male electrical connector (item 4, figure 3).

6. Remove a $\frac{1}{4}$ inch of insulation from the ends of the wires, then install a short piece of spaghetti sleeving over each wire end and slide back on the wire. Position the wire ends up and slide a new gasket (5) over the wires. Tin each wire end with solder, then insert wires one at a time into the proper pin of connector (4) and solder. Slide the sleeving over the pin after solder has cooled.

Coil Resistance, Ohms/Wire Code	Series Aiding	Parallel	Differential
40 / Yellow	150 ma	300 ma	—
280 / White	50 ma	100 ma	100 ma
2200 / Blue	20 ma	40 ma	40 ma
5300 / Black	12.5 ma	25 ma	25 ma

Table 5. Input Current required for max. armature deflection of 0.020 inch.

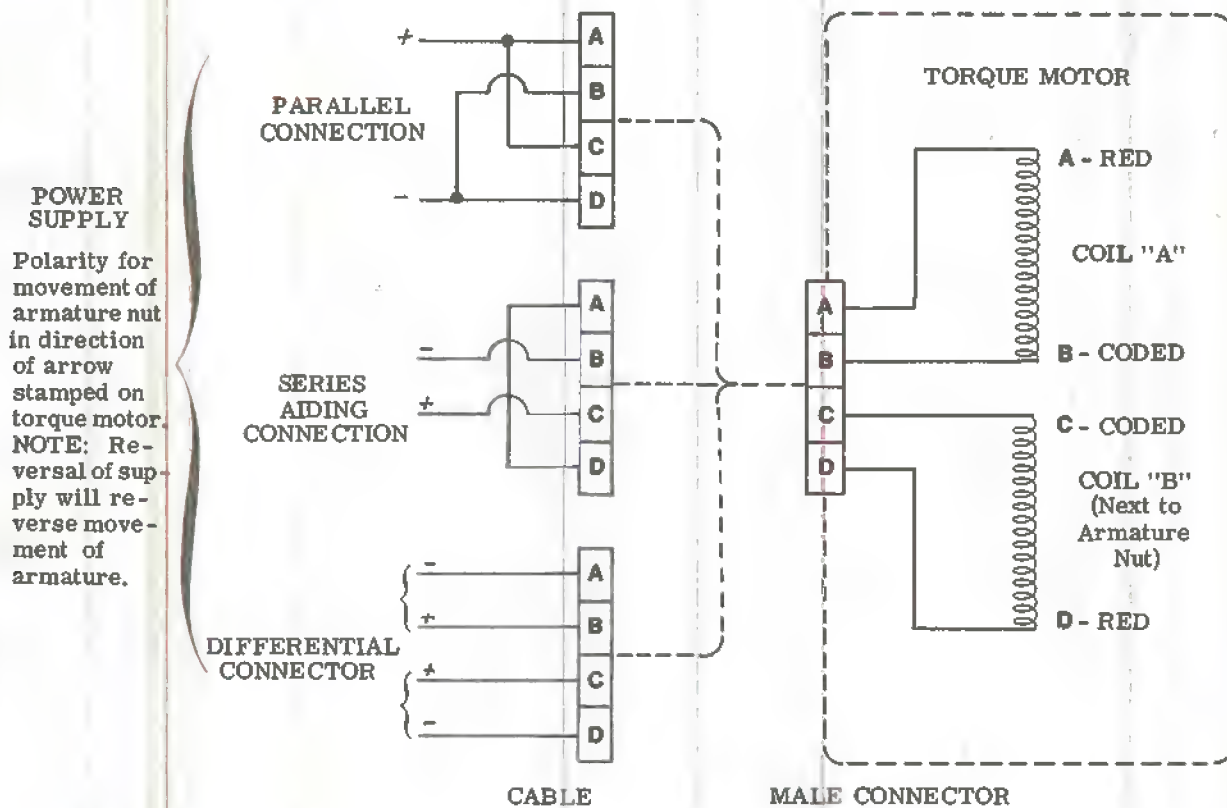


Figure 5. Schematic Diagram of Possible Wiring Connections to a Torque Motor.

7. Assemble connector to the body with four screws (3).

NOTE

Cover (7), screws (8), and washers (9) will be installed following test and calibration, Section VII.

Section VII - TEST PROCEDURE

A. TEST CONDITIONS:

HYDRAULIC

Fluid Medium: Oil viscosity grades: 150-315 SUS
(32-68 cSt) @100° F (38°C)
Running: 70-250 SUS (13-54 cSt).
At start-up: 1000 SUS (220 cSt).
Maximum

Fluid Temperature: 120° ± 5° F

Flow Range: FCGT-02-A-11 5- 250 cu. in./min.
FCGT-02-B-11 50-1000 cu. in./min.

Operating Pressure: 3000 PSI
(Maximum)

Reverse Free Flow: 1400 cu. in./min.
(Maximum)

Differential Operating Press: 150 PSI

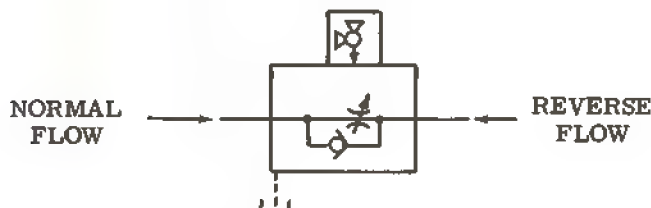
Power Supply (Recommended for two 40 Ohm coils connected parallel).
See installation drawing 521555.
EMCS-P-30
Assembly 631995

Hysteresis (With recommended power supply).
4% of max. current without dither.
2% of max. current with 45 mA (rms) dither.

Dither (Optimum performance) 45 mA (rms) @60 Hz.

Subplate FGTM-02-10 (Assy. 251168)

Bolt Kit BKFCGT-02-644 (Bolts must be grade 7 or better)



Standard Graphic Symbol for Fluid Power Diagrams

B. TEST

NOTE

A sample hydraulic circuit is shown in figure 6. Modify an existing test stand or obtain the necessary components to assemble the test circuit.

1. Connect subplate FGTM-02-10 (Assembly 251168) to the test stand and mount the FCGT-02 with bolt kit BKFCGT-02-644.

2. Refer to sample test circuit figure 6 during the following steps:

- Close globe valves (6) and (15).
- Open globe valves (1) and (12). (Vent to facilitate priming and load relief valve (11).
- Energize hydraulic system. After system has primed, alternately adjust test relief valve (2) while closing globe valve (1) until 3000 PSI is read on gage (5) and globe valve (1) is completely closed.
- Open globe valve (6).

NOTE

Valve may be unstable until all air is purged from the system. Allow at least one minute for valve to stabilize before adjusting the metering spool.

- Adjust metering spool (12 figure 3) for zero flow. Use a 0.05 inch hex key.
 - Open globe valve (15) and adjust metering spool (12) to the minimum flow condition noted in Table 6.
6. Use a beaker to measure the minimum flow.

MODEL	MINIMUM FLOW
FCGT-02-A-***-11	5 cu. in./min. (81.9 cu. cm./min.)
FCGT-02-B-***-11	50 cu. in./min. (819.35 cu. cm./min.)

Table 6. Minimum Flow Adjustment.

3. Turn off hydraulics and remove valve from the test stand. Place on the work bench with torque motor (10) up. Slightly loosen screws (8) that hold torque motor (10).

4. Connect power supply (9, figure 6) to valve. Observe polarity shown in figure 5. If milliammeter reads in reverse, reverse its connections.

5. Set dither control high enough to feel a vibration at the torque motor armature. Position the torque motor for maximum dither as felt at the torque motor armature nut, then tighten the torque motor mounting screws to 30 lb. in. Dither must still be felt at the torque motor armature.

6. Apply full signal (300 mA for two 40 Ohm coils in parallel) to the torque motor and return to zero current. Dither must be felt throughout the entire cycle. If dither fades, repeat steps (5) and (6).

Refer to Figure 5 for correct full signal current if coils are other than noted.

7. Recalibrate minimum flow, perform steps (1) and (2).

8. Install cover (7). Secure with screws (8) and lockwashers (9). Check valve performance with power supply. Remove valve from the test stand.

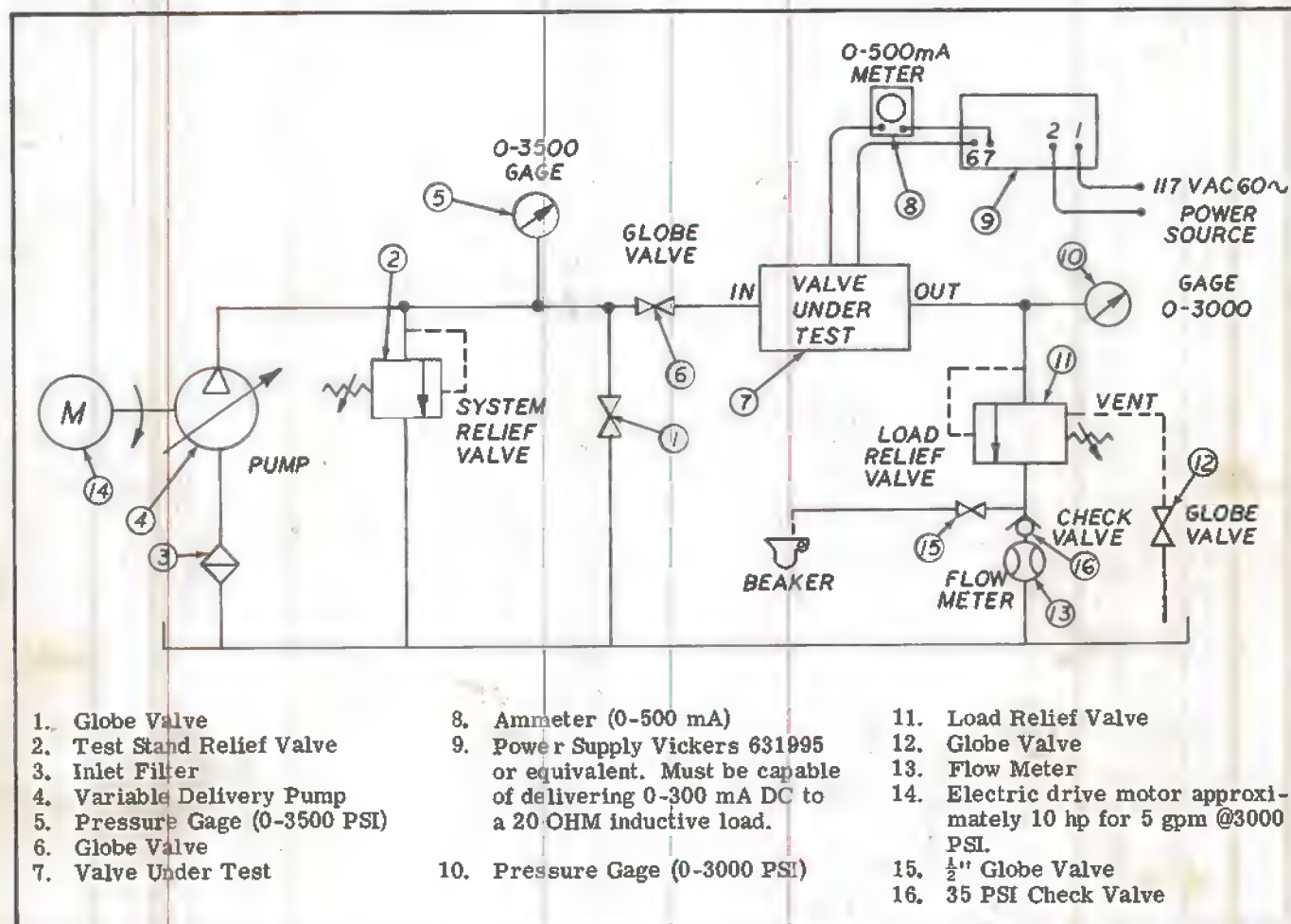
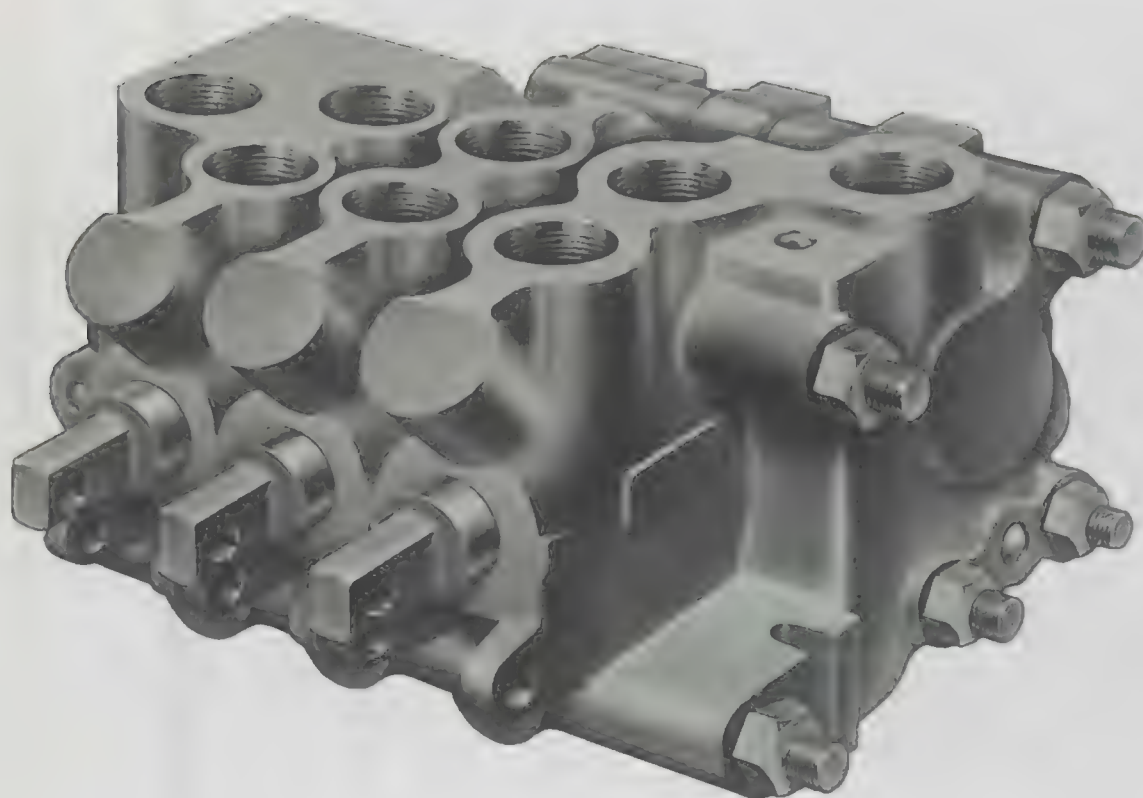


Figure 6. Test Stand for FCVT-02-*-11 Valve.

Overhaul Manual

**Multiple
Unit
Valves**

CM2 & CM3 Series -20 Design
CM2 & CM3 Series -30 Design



Vickers, Incorporated

1401 Crooks Road
Troy, Michigan 48064

Revised 7-1-86

M-2400-S

FOREWARD

This manual illustrates and describes the recommended procedure for servicing the CM2 and CM3 series valves.

Valves of the -30 design will be referred to throughout this manual, but this information is essentially the same for the -20 design valves. Service parts are generally interchangeable between the -20 and -30 design valves, however, it is recommended that the catalogs referenced in Table I be consulted for service parts for the respective design. Customers who wish to incorporate -30 design sections in -20 design valves can do so without concern. In this instance, a tie bolt must be left out. This does not affect the operation or function of the valve as one tie bolt on the -20 design is redundant.

To service these valves, read this manual thoroughly, and follow the instructions carefully.

Comments or suggestions concerning this publication may be directed to the Mobile Service Department of Vickers.

TABLE OF CONTENTS

Section	Page
I INTRODUCTION	2
A. Purpose of Manual	2
B. General Information	2
II DESCRIPTION	3
A. General	3
B. Assembly and Construction	3
C. Detent Features	3
D. Mounting	3
E. Installation Drawing	3
III PRINCIPLES OF OPERATION	4
A. General	4
B. Operating Sections	4
1. Inlet Sections	4
2. Outlet Sections	4
3. Spool Operation	4
4. Flow Control and Relief Valve	6
5. Check Valve	6
6. Detent	6
7. Tandem Operation	7
C. Non-Operating Sections	7
1. General	7
IV INSTALLATION AND OPERATING INSTRUCTIONS ..	8
A. Installation Drawings	8
B. Mounting	8
C. Port Connections	8
D. Relief Valve	8
E. Tandem Installation	8
F. Hydraulic Tubing	8
G. Hydraulic Fluid Recommendations	8
V INSPECTION AND MAINTENANCE	9
A. Service Tools	9
B. Inspection	9
C. Adding Fluid to the System	9
D. Lubrication	9
E. Replacement Parts	9
F. Trouble Shooting	9
VI OVERHAUL	10
A. General	10
B. Disassembly	10
C. Cleaning, Inspection and Repair	10
D. Assembly	11
VII VALVE OPTIONS	11
A. General	11
1. Anti-Cavitation Check Valve	11
2. Anti-Cavitation Check with Cylinder Port Relief Valve	11
VIII TESTING OF MULTIPLE UNIT VALVES	11

SECTION 1 - INTRODUCTION

A. PURPOSE OF MANUAL

This manual has been prepared to assist the users of Vickers CM2 and CM3 Series-20/-30 Design Multiple Unit Valves in properly maintaining and repairing their units. In the sections which follow, the multiple unit valves are described in detail, their theory of operation is discussed and instructions are given for their proper installation, maintenance and overhaul.

B. GENERAL INFORMATION

1. Related Publications - Service parts information and installation dimensions are not contained in this manual. The parts catalogs and installation drawings listed in Table I are available from your local Vickers Mobile Division application engineering office, or from:

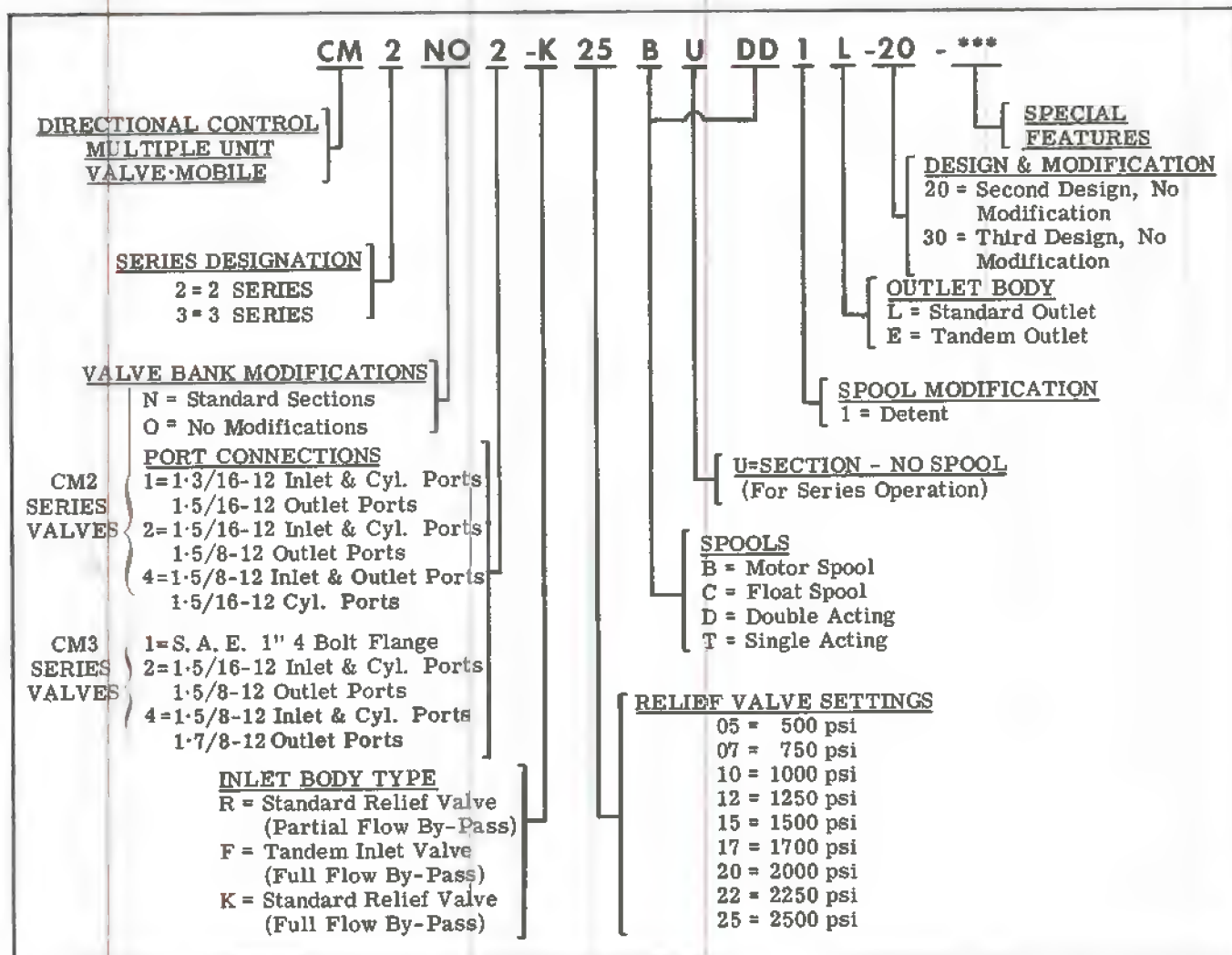
Vickers
Mobile Hydraulics Division
P. O. Box 302, Troy, Michigan 48064
Attn: Mobile Service Department

2. Model Codes - There are many variations within each basic model series, which are covered by variables in the model code. Table II is a complete breakdown of the codes covering these units. Service inquiries should always include the complete unit model number, which is stamped on the valve bodies.

TABLE I AVAILABLE PARTS CATALOGS AND INSTALLATION DRAWINGS

MODEL SERIES	PARTS CATALOGS	INSTALLATION DRAWINGS
CM2-20	M-2401-S	M-259218
CM2-30	M-2403-S	
CM3-20	M-2402-S	M-259219
CM3-30	M-2404-S	

TABLE II - MODEL CODE BREAKDOWN



SECTION II - DESCRIPTION

A. GENERAL

CM2 and CM3 Series -20/-30 Design Valves are made up of directional control valve sections mounted in banks and connected internally to common pressure and tank return passages. A valve bank usually consists of an inlet and operating (R*, F*, or K*), a number of operating sections (*) and an operating and outlet section (*L or *E). Each operating section contains a sliding spool (for example B, C, D or T Spool). In valve banks where only one operating section is required, an R* section is used with an L or E tank plate section.

B. ASSEMBLY AND CONSTRUCTION

Figure 1 is a cross-sectional view showing the construction and assembly of a three-section valve. Each section normally contains a sliding spool with centering springs and a check valve. The inlet section also contains a relief valve assembly.

Passages between the bodies connect each section to the common inlet and tank ports. Seal rings between the sections seal the connecting passages. Sections are held together by studs and nuts.

C. DETENT FEATURES

1. Spool Detents - A spool detent assembly consists of a special end cap with a spring loaded plunger and a spool extension. The plunger engages in grooves of the spool extension to hold the spool in the desired position (see Figure 9).

D. MOUNTING

CM2 and CM3 Series -20/-30 Design Valves have mounting lugs cast into the inlet and outlet sections.

E. INSTALLATION DRAWING

Vickers Mobile Hydraulics Division application engineers should be consulted for valve ratings and applications. (Refer to the installation drawing listed in Table I for the performance information.)

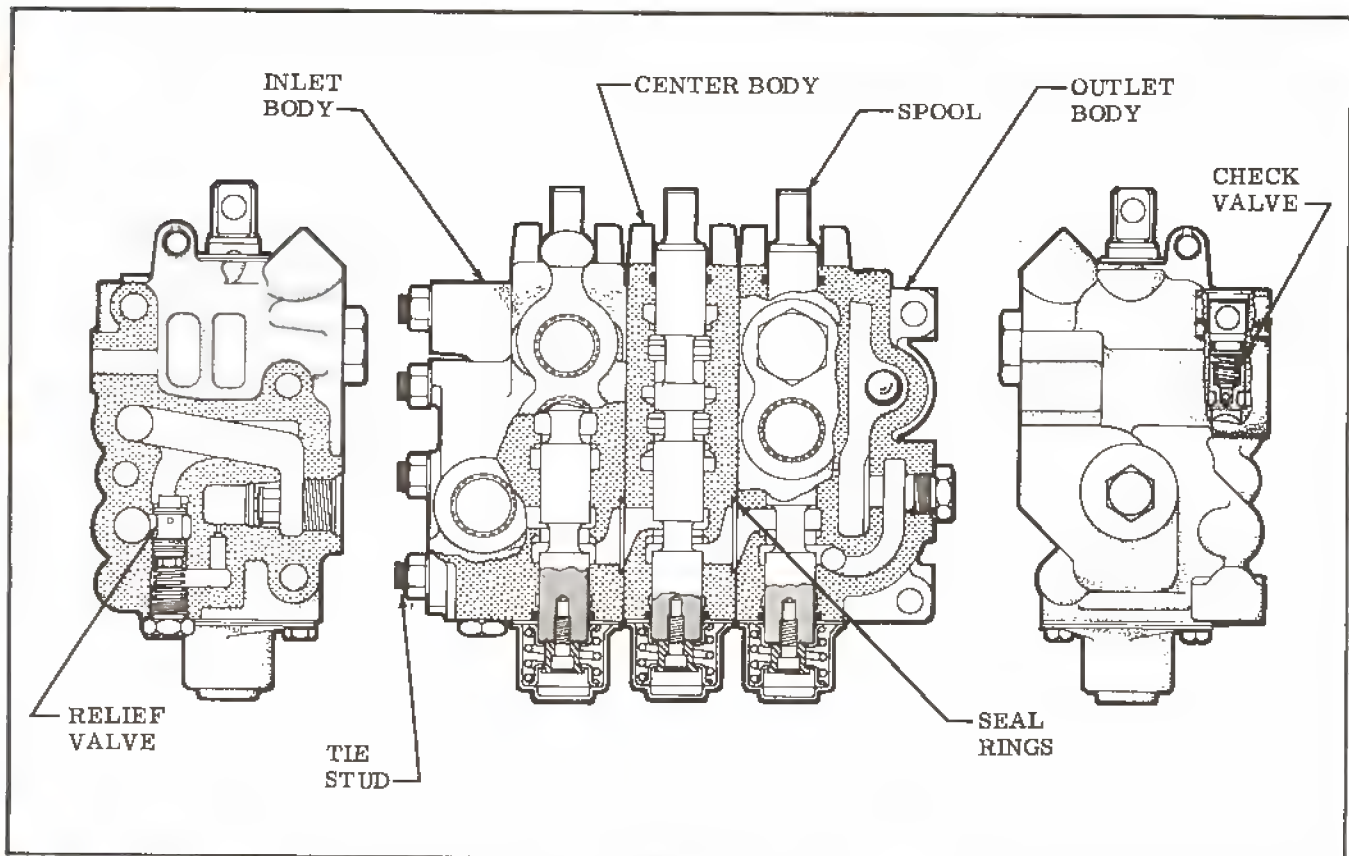


Figure 1

SECTION III - PRINCIPLES OF OPERATION

A. GENERAL

Figure 2 is a schematic illustration of a four section valve, showing the cylinder ports and the by-pass pressure and tank passages. The pressure passage is used to carry fluid to the cylinder ports when the spools are shifted. The by-pass passage permits flow directly to the outlet when the spools are not being operated. The tank passages carry fluid to the tank port by return flow from the cylinder ports or fluid diverted past the flow control and relief valve.

The spools are shown in the centered or neutral position. Under these conditions, fluid in the pressure passage is blocked from the cylinder ports by the spool lands. Flow through the valve is through the by-pass and tank passage to the tank port.

B. OPERATING SECTIONS

1. Inlet Section - The CM2 and CM3 series valve banks may be obtained with operating, R*, F*, or K*, inlet sections. These sections are available with B, C, D, or T, type spools.

These sections are individually described below.

(a) R* Section - The R* section is equipped with an integral relief valve for overload protection. It is built to accept a check valve to prevent return flow through the valve.

The integral relief valve, with an orifice plug, also acts as a partial flow control valve. This feature lowers the pressure drop between the inlet and outlet ports. (See paragraph 4 for relief valve and flow control operation.)

The relief valve cracking pressure is pre-set at the factory. The pre-set cracking pres-

ures range up to 2500 psi maximum. (See Table II Model Code for pressure settings.)

(b) F* Section - The F* section has two pressure connections. One connection is made to the pump source and the second connection is made with a preceding valve assembly to accept the by-pass flow for tandem operation.

The F* section like the R* section is built to accept a check valve to prevent return flow when this feature is required. However, F* sections do not employ relief valve or partial flow by-pass.

(c) K* Section - The K* section is essentially the same as the R* section except it has a full flow by-pass feature.

2. Outlet Sections

(a) *L Section - When two or more spools are required in a valve bank, the last section will be an *L section. The "*" denotes the spool type. This section contains the exhaust oil port and also is built to accept a check valve to prevent back flow when this feature is required.

(b) *E Section - This section is used for tandem operation by providing an outlet connection through which the by-pass feature for pump unloading is extended on to a subsequent valve bank. It is used in conjunction with an "F*" type inlet section in the next valve bank. Like the *L section it contains an operating spool and is built to accept a check valve to prevent back flow when this feature is required.

3. Spool Operation

General - Four standard spool designs are available ("B," "C," "D," or "T"). Any combination of spools may be used with a valve bank to perform a variety of operations. All operating spools are equipped with centering springs which return the spools to neutral.

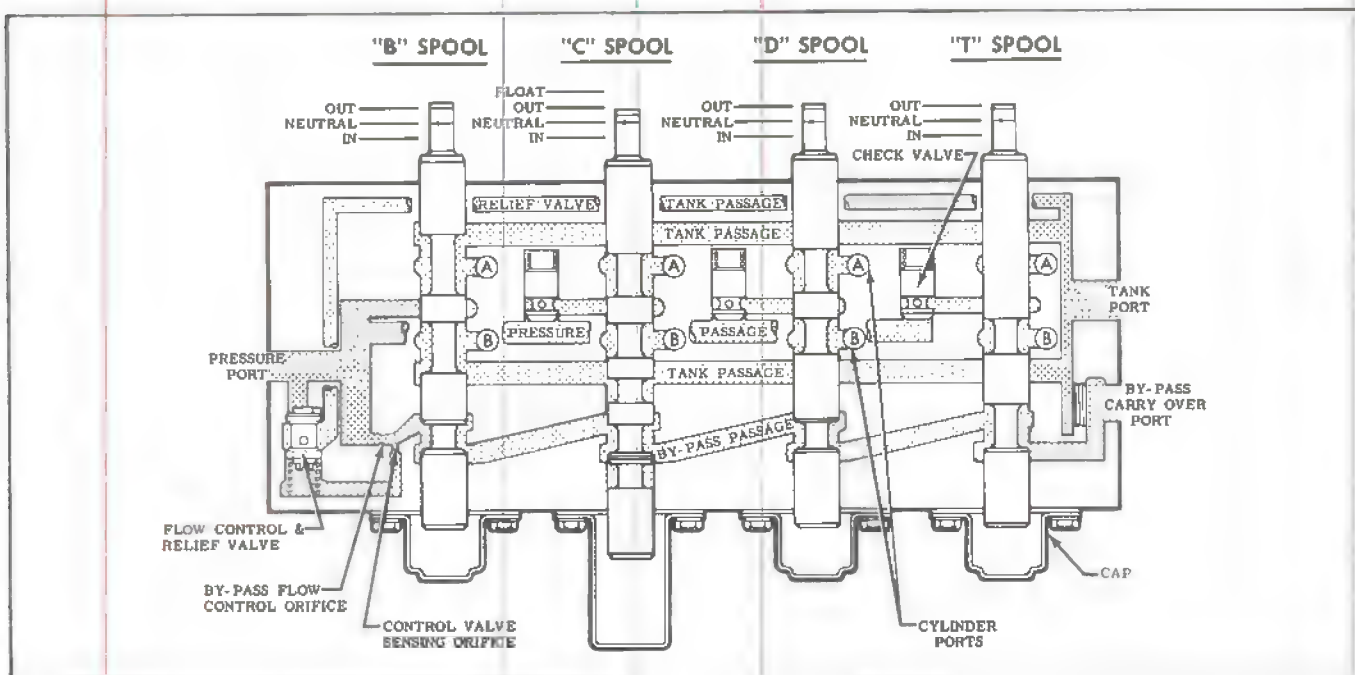


Figure 2

For convenience A. S. A. symbols (Y32. 10-1958) are also shown with the following descriptions of each spool.

(a) **"B"-Motor Spool** - "B" spools are used when flow is directed to the operation of a hydraulic motor instead of a cylinder. These spools are double acting in character so that the motor may be rotated in either direction. The cylinder ports are left partially open in the neutral position to allow free flow of oil between the motor and reservoir. See Figure 3 for spool position vs. flow characteristics.



"B" MOTOR SPOOL

(b) **"C" Float Spools** - "C" spools are double acting with an additional float position. The spool is retained in the float position by a detent, and it is spring centered to neutral from the "in" and "out" positions. Both cylinder ports are open to the tank in the float position to permit free flow of oil in either direction. See Figure 4 for spool position versus flow.



"C" FLOAT SPOOL

(c) **"D" Double Acting Spool** - "D" spools are used for applications where pump flow must be directed to either end of a cylinder, depending on the direction of movement required. The end of the cylinder not under pressure has its return flow directed to tank via internal coring of the valve sections. See Figure 5 for spool position versus flow.



"D" DOUBLE ACTING SPOOL

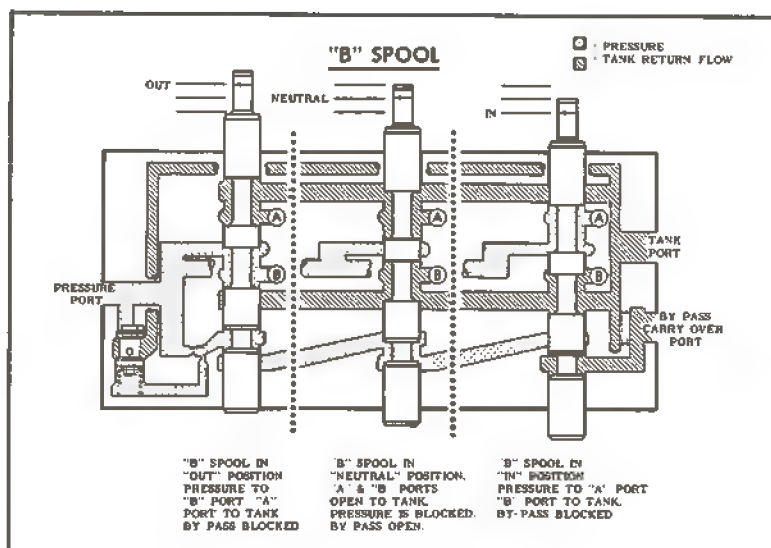


Figure 3

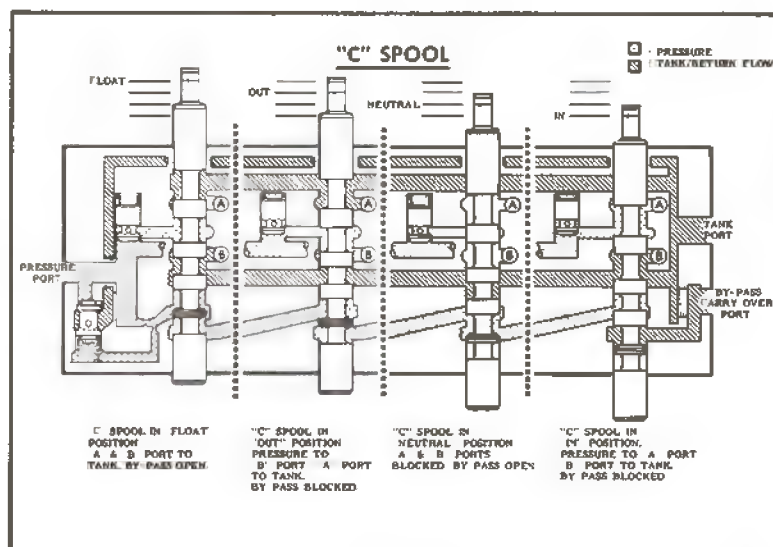


Figure 4

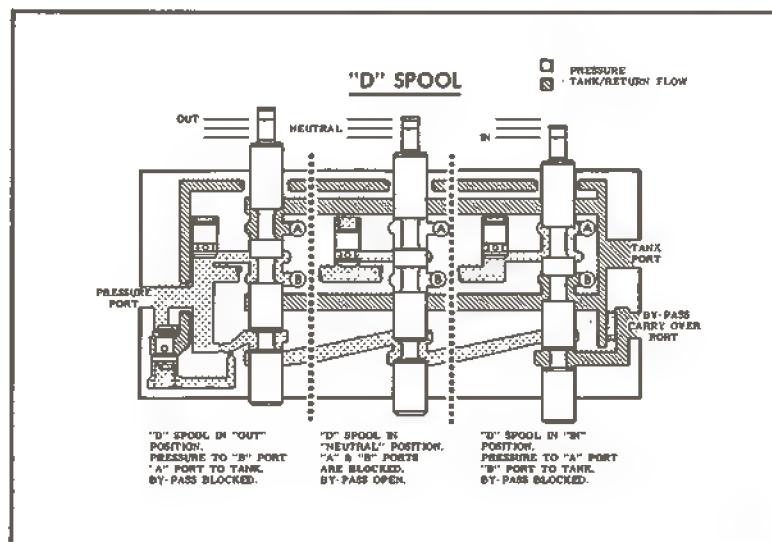
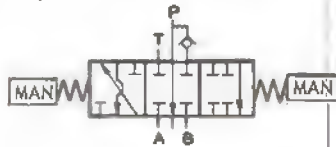


Figure 5

(d) **"T" Single Acting Spool** - "T" spools direct flow to one end of an operating cylinder only as in the example of the lift mechanism on a fork-type truck. Return flow is from the same end of operating cylinder and relies on gravity or mechanical means. See Figure 6 for spool position versus flow.



"T" SINGLE ACTING SPOOL

4. Flow Control and Relief Valve

General - The partial flow by-pass system in the CM2 and CM3 series valves makes use of a compound type flow control and relief valve arrangement. By sensing the pressure drop across an orifice at the entrance to the by-pass, the valve acts as a flow control to limit flow through the by-pass.

When a spool is completely shifted, the flow control is inoperative and full pump volume is available to the system. The control valve then functions as an overload relief valve. System pressure is limited to a prescribed maximum by the action of this valve.

(a) **Flow Control** - Figure 7A shows the flow control valve operation with the spool in neutral. Flow across the by-pass orifice results in a pressure drop. The decreased pressure is sensed at the spring end of the valve sub-assembly through a sensing orifice. The slightly higher pressure at the other end of the valve permits it to shift down, diverting excess flow to the tank passage. With less than rated flow, shown on the installation drawing, there would be insufficient pressure drop across the by-pass orifice and the flow control valve would return to the closed position. Since the control valve is held closed by the large spring and all flow would be through the by-pass passage.

(b) **Relief Valve** - Operation of the relief valve feature is shown in Figure 7B. Here an operating spool would be shifted, porting fluid to the system and blocking the by-pass.

Figure 7B shows operation at less than the relief valve setting. There is no flow over the by-pass orifice, so full system pressure is sensed at the spring end of the control valve, as well as the

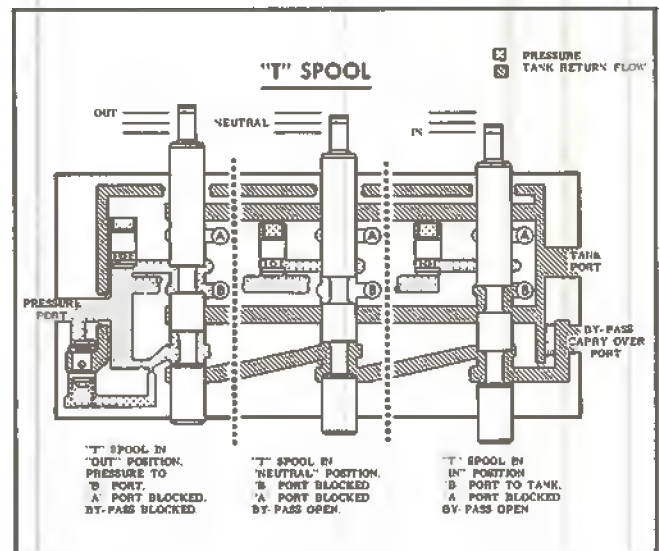


Figure 6

opposite end. The valve is thus hydraulically balanced and the large spring holds it closed.

Maximum pressure is determined by the setting of the small spring inside the control valve assembly. When system pressure is high enough to overcome this small spring, the poppet is forced off its seat. (See Figure 7C) Fluid immediately flows past the poppet to the tank passage. This flow creates a pressure drop across the sensing orifice and the control valve is no longer hydraulically balanced. When this pressure differential is great enough to overcome the large spring, the valve shifts permitting flow to the tank passage.

5. **Check Valve** - Timing of the valve spools is such that the cylinder port opens to pressure and tank before the by-pass passage is completely blocked. To prevent return flow from passing into the pressure passage, check valves are provided in each operating section except the "B" section. The load is thus prevented from dropping.

6. **Detent** - The spool detent consists of a special end cap with a spring loaded plunger. The plunger engages in a groove in the spool extension and holds the spool in the desired position. Detent parts are illustrated in the exploded view in Figure 9A.

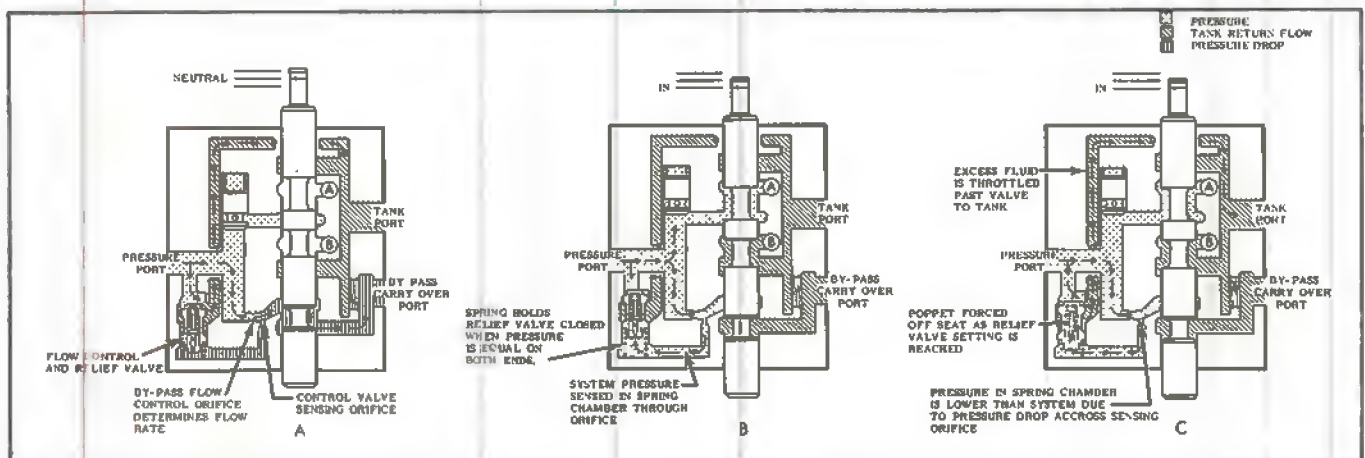


Figure 7

7. **Tandem Operation** - Tandem operation permits operation of two banks of valves from the same pumping source. An internal plug in the outlet section of the first bank (see Figure 8) separates the by-pass passage from the tank passage. Cylinder exhaust oil is returned to tank via the alternate discharge port, and by-pass oil is directed out the primary discharge port to the by-pass port of the bank.

In Figure 8, either bank can be operated separately or both simultaneously. This is possible because of the tandem by-pass connection from the inlet connection of the first bank to the F inlet connection of the second bank. If neither bank is operating, part of the fluid flows through both by-pass passages directly to tank. The balance is diverted through the tank passage of the first section as shown in Figure 2.

In some cases, it is desirable to have tandem valves connected in series where, the second bank is dependent upon the operation of the first bank. The first bank has control priority because the tandem by-pass connection is not used. The cylinder by-pass oil of the first bank is directed out of primary discharge port to the inlet port of the second bank. Use a "K" inlet section in the first bank if full flow is desired to the second bank. Otherwise reduced flow will be encountered.

C. NON-OPERATING SECTIONS

1. **General** -The CM2 valve non-operating sections are the "E" and "L" outlet sections and a center "U" section. These sections do not have operating spools. The functions of these sections are as follows:

(a) **"E" Outlet Section** - The "E" type section provides an outlet section by which the by-pass feature for pump unloading is extended to a subsequent valve bank (tandem operation). It is generally used in conjunction with the "F" type inlet section on the subsequent valve bank assembly. This "E" type section is only used with one spool banks.

(b) **"L" Outlet Section** - The "L" type section is basically the same section as the "E" section except it provides only one connection for exhaust oil and is used as the last section on a single spool bank where tandem operation is not required.

(c) **"U" Center Section** - The "U" section, when mounted between two operational sections, permits the operation of two cylinders or motors in series. This is accomplished by porting the outlet of the first operating section to the inlet of the second operating section.

NOTE

It should be noted that the pressure drop across the valve, when used in series operation, will be the sum of the pressure drops for each section.

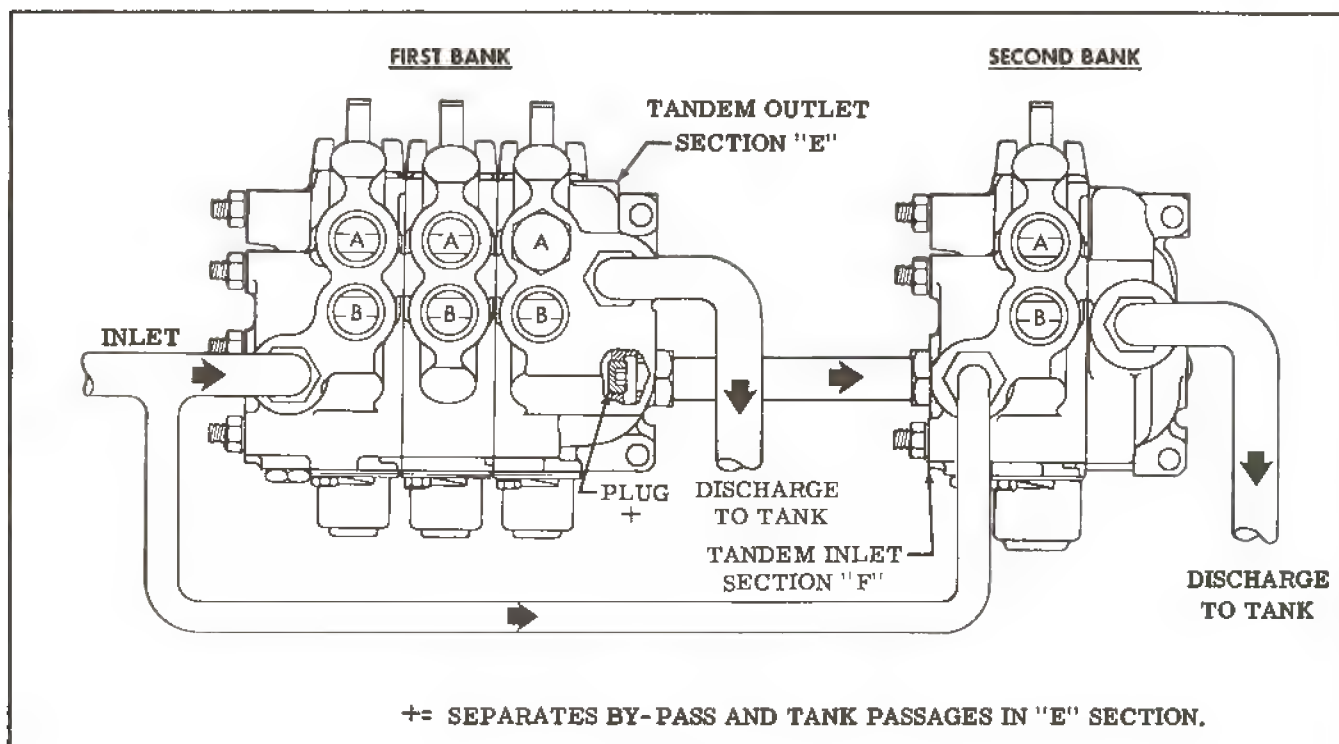


Figure 8

SECTION IV - INSTALLATION AND OPERATING INSTRUCTIONS

A. INSTALLATION DRAWINGS

Installation drawings M-259218 and M-259219 should be consulted for installation dimensions.

B. MOUNTING

These valves can be mounted in any position. Enough clearance must be left to provide access to the port connections and to permit actuating the control mechanism. The valves should be securely bolted to the mounting surface.

NOTE

Valves should be mounted on a relatively flat surface to prevent possible distortion of the valve bodies.

C. PORT CONNECTIONS

All connections are compatible with standard SAE fittings and "O" ring seals. It is only necessary to tighten fittings so that there is a firm metal-to-metal contact.

D. RELIEF VALVE

Relief valve sub-assemblies in the inlet section are preset and tested by Vickers for given pressure settings. Selection of the relief valve setting is based on the work requirements of the system. If a different relief valve setting is required, the valve sub-assembly should be replaced (see parts catalog M-2401-S, M-2402-S, M-2403-S or M-2404-S).

E. TANDEM INSTALLATION

1. Piping arrangement for tandem series operation is shown in Figure 8.

2. The outlet section of the first bank must be an "E" section which is equipped with a plug (see Figure 8) to block the primary discharge port from tank. The discharge to tank port must be connected to tank.

NOTE

Slight leakage past the internal plug is permissible. The plug should not be tightened excessively, as there is the danger of distorting the body and causing the spool to bind.

F. HYDRAULIC TUBING

NOTE

For instructions on pickling, refer to Vickers Instruction Sheet M-9600.

1. All tubing must be thoroughly cleaned before installation to remove dirt, rust and scale. Recommended methods of cleaning are sand blasting, wire brushing and pickling.

2. The number of bends in tubing should be kept to a minimum to prevent excessive turbulence and friction of oil flow.

3. Tubing should not be bent too sharply. The minimum radius for bends is three times the inside diameter of the tube.

4. To minimize flow resistance and the possibility of leakage, only as many fittings and connections as are necessary for proper installation should be used.

G. HYDRAULIC FLUID RECOMMENDATIONS

The oil in a hydraulic system serves as the power transmission medium. It is also the system's lubricant and coolant. Selection of the proper oil is a requirement for satisfactory system performance and life. Oil must be selected with care and with the assistance of a reputable supplier.

TWO IMPORTANT FACTORS IN SELECTING AN OIL ARE:

1. Antiwear Additives - The oil selected must contain the necessary additives to insure high antiwear characteristics.

2. Viscosity - The oil selected must have proper viscosity to maintain adequate lubricating film at system operating temperature.

SUITABLE TYPES OF OIL ARE:

1. Crankcase Oil meeting API service classification MS. The MS (most severe) classification is the key to proper selection of crankcase oils for Mobile hydraulic systems.

2. Antiwear Type Hydraulic Oil - There is no common designation for oils of this type. However, they are produced by all major oil suppliers and provide the antiwear qualities of MS crankcase oils.

3. Certain Other Types of Petroleum Oils are suitable for Mobile hydraulic service if they meet the following provisions:

(A) Contain the type and content of antiwear compounding found in MS crankcase oils or have passed pump tests similar to those used in developing the antiwear type hydraulic oils.

(B) Meet the viscosity recommendations shown in the following table.

(C) Have sufficient chemical stability for Mobile hydraulic system service.

The following types of oil are suitable if they meet the above three provisions:

Series 3 Diesel Engine Oil
Automatic Transmission Fluid Types A, F
and DEXRON
Hydraulic Transmission Fluid Types C-1
and C-2

The following table summarizes oil types recommended for use with Vickers equipment in Mobile hydraulic systems by viscosity and service classification.

TABLE III

Hydraulic System Operating Temperature Range (Min. * To Max.)	SAE Viscosity Designation	American Petroleum Institute (API) Service Classification
0°F. to 180°F.	10W	MS
0°F. to 210°F.	10W-30**	MS
50°F. to 210°F.	20-20W	MS

* Ambient Start Up Temperature

** See paragraph on Viscosity Index

OPERATING TEMPERATURE:

The temperatures shown in table III are cold start-up to maximum operating. Suitable start-up procedures must be followed to insure adequate lubrication during system warm-up.

ARCTIC CONDITIONS:

Arctic conditions represent a specialized field where extensive use is made of heating equipment before starting. If necessary, this, and judicious use of SAE 5W or SAE 5W-20 oil in line with the viscosity guide lines shown in the table, may be used. Dilution of SAE 10W (MS) oil with maximum of 20% by volume of kerosene or low temperature diesel fuel is permissible. During cold start-up, avoid high speed operation of hydraulic system components until the system is warmed up to provide adequate lubrication. Operating temperature should be closely monitored to avoid exceeding a temperature of 130°F. with any of these light weight or diluted oils.

OTHER FACTORS IN SELECTING AN OIL ARE:

1. Viscosity - Viscosity is the measure of fluidity. In addition to dynamic lubricating properties, oil must have sufficient body to provide adequate sealing effect between working parts of pumps, valves, cylinders and motors, but not enough to cause pump cavitation or sluggish valve action. Optimum operating viscosity of the oil should be between 80 SSU and 180 SSU. During sustained high temperature operation viscosity should not fall below 60 SSU.

2. Viscosity Index - Viscosity index reflects the way viscosity changes with temperature. The smaller the viscosity change the higher the viscosity index. The viscosity index of hydraulic system oil should not be less than 90. Multiple viscosity oils, such as SAE 10W-30, incorporate additives to improve viscosity index (polymer thickened). Oils of this type

generally exhibit both temporary and permanent decrease in viscosity due to the oil shear encountered in the operating hydraulic system. Accordingly, when such oils are selected, it is desirable to use those with high shear stability to insure that viscosity remains within recommended limits.

3. Additives - Research has developed a number of additive agents which materially improve various characteristics of oil for hydraulic systems. These additives are selected to reduce wear, increase chemical stability, inhibit corrosion and depress the pour point. The most desirable oils for hydraulic service contain higher amounts of antiwear compounding.

SPECIAL REQUIREMENTS:

Where special considerations indicate a need to depart from the recommended oils or operating conditions, see your Vickers sales representative.

CLEANLINESS:

Thorough precautions should always be observed to insure that the hydraulic system is clean:

1. Clean (flush) entire system to remove paint, metal chips, welding shot, etc.

2. Filter each change of oil to prevent introduction of contaminant into the system.

3. Provide continuous oil filtration to remove sludge and products of wear and corrosion generated during the life of the system.

4. Provide continuous protection of system from entry of airborne contamination.

5. During usage, proper oil filling and servicing of filters, breathers, reservoirs, etc., cannot be over-emphasized.

SECTION V - INSPECTION AND MAINTENANCE

A. SERVICE TOOLS

No special tools are required to service Vickers CM2 or CM3 series multiple unit valves.

B. INSPECTION

Periodic inspection of spool operation, oil condition and pressure connections saves time-consuming breakdowns and unnecessary parts replacement.

1. All hydraulic connections must be tight. Loose connections not only allow leakage but also permit air to be drawn into the system, resulting in noisy and erratic operation.

2. Spools should return to neutral automatically when the control is released. The centering spring force is approximately 60 to 120 pounds. If more force is necessary, the spool may be binding or control linkage may be faulty.

3. System filters and reservoir should be checked periodically for foreign particles. If excessive contamination is found, the system should be drained. The reservoir must be cleaned thoroughly before refilling.

C. ADDING FLUID TO THE SYSTEM

When hydraulic fluid is added to the system, it should be pumped through a 25 micron filter. If such a filter is not available, or practical to use in the

field, a funnel with a fine wire screen (200 mesh or better) can be used.

It is important that oil be clean and free of all substance which will cause improper operation and excessive wear of the pump or other hydraulic units in the system. Be sure to purge all air from the system.

D. LUBRICATION

Internal lubrication is provided by system oil.

E. REPLACEMENT PARTS

Only genuine parts manufactured or sold by Vickers should be used as replacement parts for these valves. Only Vickers knows the true quality level required of each part. These are listed in parts catalogs M-2401-S, M-2402-S, M-2403-S and M-2404-S copies of which are available on request.

F. TROUBLE SHOOTING

Table IV lists the difficulties which may be experienced with the unit and hydraulic system. It indicates the cause and remedy for each of the troubles listed. It should always be remembered that pressure and delivery are factors which are usually dependent upon each other. Adequate pressure gage equipment and a thorough understanding of the operation of the complete hydraulic system are essential to diagnose improper operation.

TABLE IV - TROUBLE, CAUSE AND REMEDY CHART

TROUBLE	PROBABLE CAUSE	REMEDY
Oil leaks at either end of spool.	Defective "O" rings in valve body.	Replace "O" rings.
Spring-centered spools do not return to neutral.	Broken springs.	Replace springs.
	Bent spool.	Replace with new section of same size and type.
	Foreign particles.	Clean system and valve.
	Misalignment of operating linkage	Check linkage for binding condition.
	Valve tank improperly torque.	Retorque nuts to specified ratings.
Detent type spools will not stay in detent position.	Worn detent barrel.	Replace detent barrel.
	Weak or broken detent spring.	Replace detent spring.
No motion, slow or jerky action of hydraulic system.	Relief valve not properly set, or stuck in base and/or worn.	Repair, clean and readjust.
	Dirt or foreign particles lodged between relief valve control poppet and seat.	Disassemble, clean and reassemble.
	Valve body cracked inside.	Replace valve section.
	Spool not moved to full stroke.	Check travel.
No relief valve action (High Pressure)	Small particle of dirt plugging orifice in relief valve sub-assembly.	Remove relief valve and check hole. If blocked, clear hole.
	Relief Valve S.A. installed backwards.	Install properly.
Load will not hold.	Oil by-passing between spool and body.	Replace valve.
	Oil by-passing piston in cylinder.	Repair or replace cylinder.
	Spool not centered	Refer to above spool remedies.
Load drops when spool is moved from neutral to a power position.	Dirt or foreign particles lodged between check valve poppet and seat.	Disassemble, clean and reassemble.
	Scored or sticking check valve poppet.	Replace poppet.

SECTION VI - OVERHAUL

A. GENERAL

During disassembly, particular attention should be given to identification of parts for reassembly. Spools are selectively fitted to valve bodies and must be returned to the same bodies from which they were removed. Valve sections should be reassembled in the same order.

Figure 9 and 9A is an exploded view showing the proper relationship for reassembly. Reference is made to these figures in the procedures which follow.

B. DISASSEMBLY

1. **Controls** - Be sure the unit is not subjected to pressure. Disconnect and cap all lines and disconnect linkage to the spool. If hand levers are used, remove the "E" rings which retain the fulcrum rod and remove the links, levers and retaining rings.

2. **Attaching Parts** - Remove the four tie studs and nuts and separate the valve sections. Be careful not to destroy or lose spacers.

3. **End Caps** - Remove the two screws which secure the spool and cap and remove the cap. If the cap

has a detent assembly, screw out the detent plug and remove the spring and piston. Remove the "O" ring from the body.

4. **Operating Spool** - Slide the spool out of its bore from the cap end and remove the "O" rings from the valve body around the spool bore. Do not remove the centering spring and retainers unless it is necessary to replace them.

5. **Check Valve** - Grip the stem of the check valve plug with pliers and pull it out of the valve body. Remove the "O" ring and back-up ring. Remove the spring and poppet from the valve body.

6. **Relief Valve Sub-Assy** - Screw out the plug which retains the relief valve and remove the "O" ring from the plug. Remove the spring and the relief valve sub-assembly. In F* sections, remove the solid plug.

7. **Valve Body** - Remove the plug and "O" ring from the blocked cylinder port on models with a single acting spool. If the alternate discharge port is plugged, it is not necessary to remove the plug unless the body is to be replaced.

C. CLEANING, INSPECTION AND REPAIR

VICKERS®

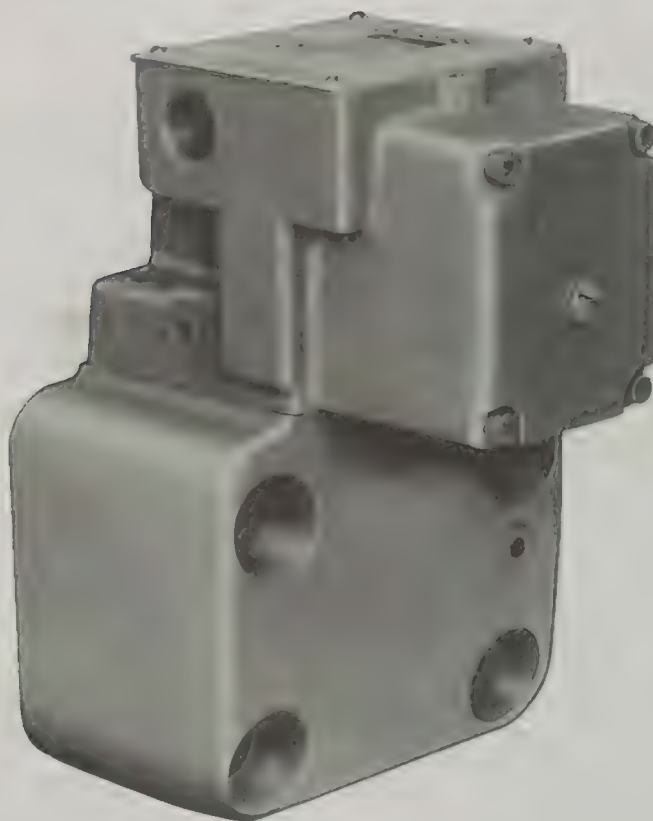
A TRINOVA COMPANY

Overhaul Manual

**Remote
Electrically
Operated
Relief Valves**

CGE-**-2-002-11/12

CGE-**-3-002-11/12



Vickers, Incorporated

P.O. Box 302
Troy, Michigan 48007-0302

Revised 5-1-86

I-3347-S

MODEL CODE BREAKDOWN

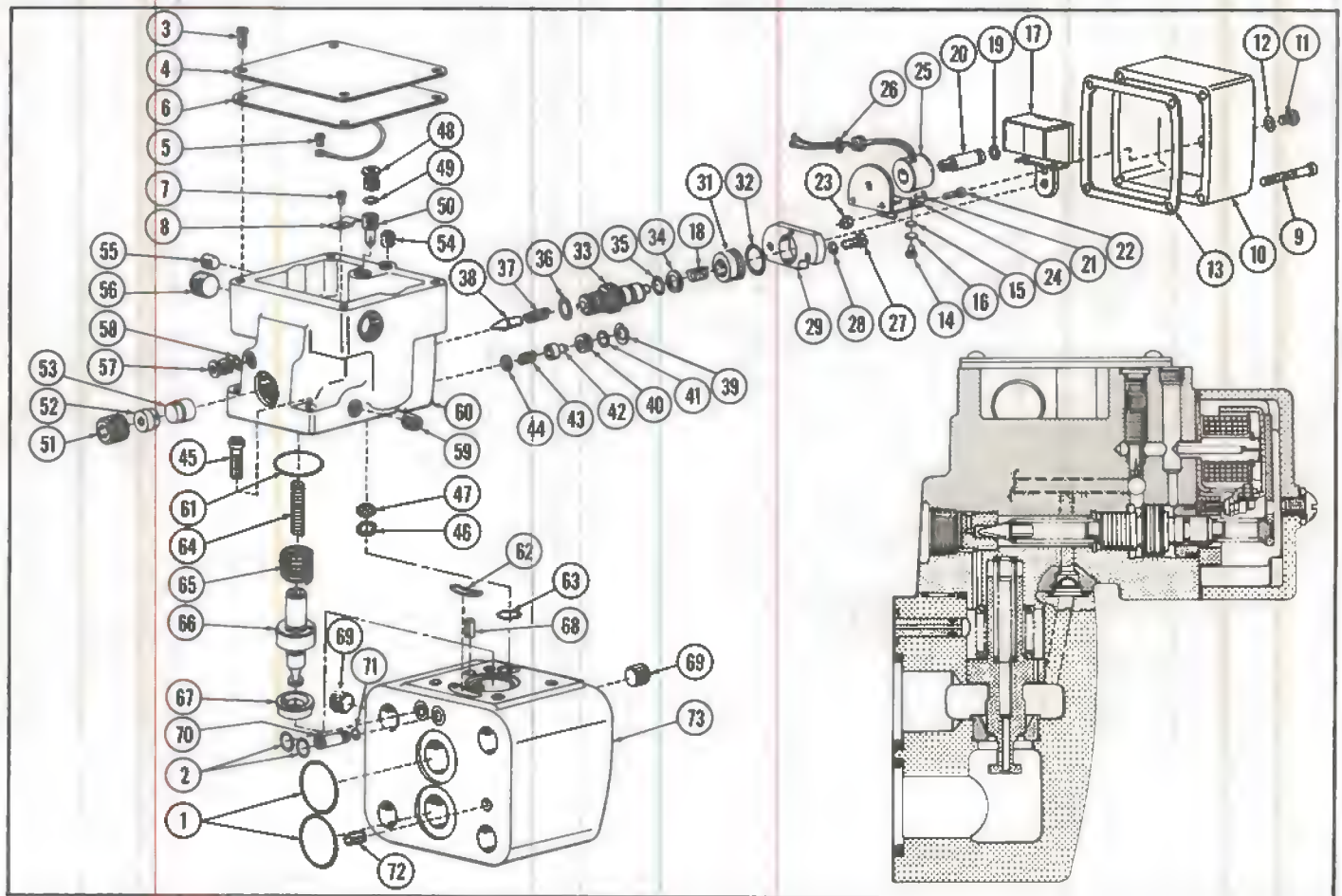
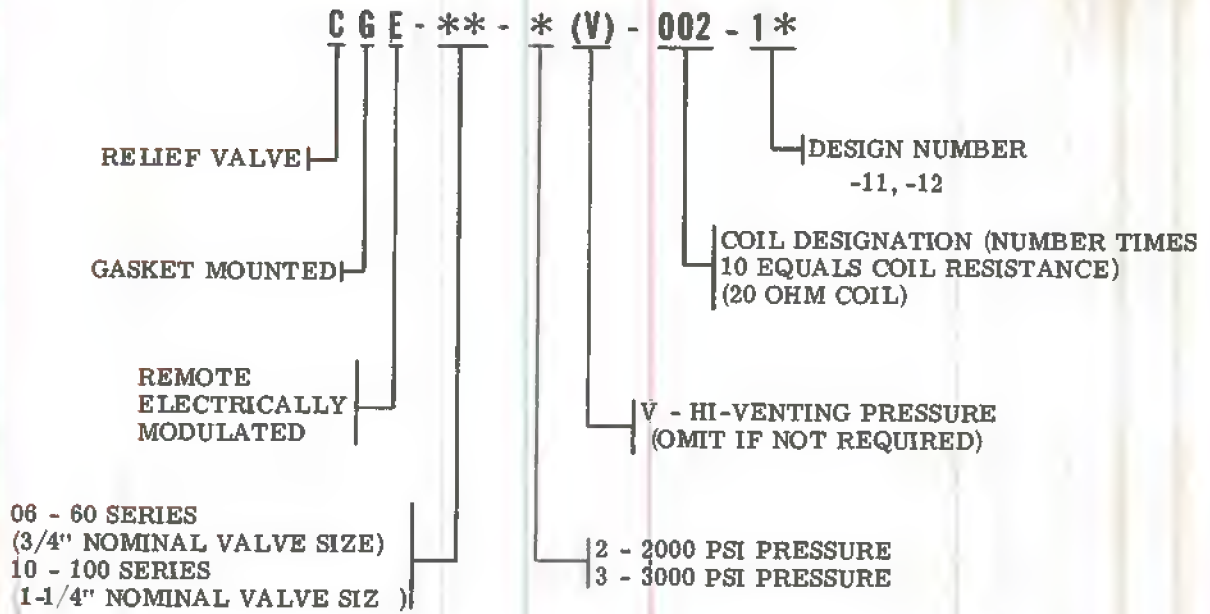


FIGURE 1. REMOTE ELECTRICALLY OPERATED RELIEF VALVE, EXPLODED VIEW.

INDEX NO.	PART NO.	NOMENCLATURE	SOURCE CODE	QTY.	USABLE ON CODE
		MODEL CGE-06-3-002-1*	A		
		MODEL CGE-06-3V-002-1*	B		
		MODEL CGE-06-2-002-1*	C		
		MODEL CGE-10-3-002-1*	D		
		MODEL CGE-10-3V-002-1*	E		
		MODEL CGE-10-2-002-1*	F		
1	▲ 154020	"O" RING		2	A, B, C
	▲ 154024	"O" RING		2	D, E, F
2	▲ 154006	"O" RING		2	
3	174638	SCREW		4	
4		NAMEPLATE		1	
5	36212	SCREW		1	
6	▲ 381908	GASKET & WIRE S/A		1	
7	353860	SCREW		1	
8	353859	CLAMP		1	
9	10359	SCREW		4	
10	373971	COVER		1	
11	253722	SCREW		1	
12	▲ 164538	SEAL		1	
13	▲ 373972	GASKET		1	
14	344966	SCREW -11 DESIGN		2	
	126017	SCREW -12 DESIGN		2	
15	233107	LOCK WASHER -11/12 DESIGN		2	
16	6453	FLAT WASHER -12 DESIGN		2	
17	942299	FLAPPER S/A -11 DESIGN		1	
	397419	FLAPPER S/A -12 DESIGN		1	
18	373977	SPRING		1	
19	102671	RETAINING RING		1	
20	377012	NOZZLE (0.047 IN. Orifice) (3000 PSI UNIT ONLY)		1	A, B, D, E
	390307	NOZZLE (0.055 IN. Orifice) (2000 PSI UNIT ONLY)		1	C, F
21	112201	SCREW		2	
22	122433	SCREW		1	
23	352641	NUT		1	
24	373533	FRAME		1	
25	346773	COIL		1	
26	▲ 154006	"O" RING		1	
27	9706	SCREW		2	
28	68905	LOCKWASHER		2	
29	377773	ADAPTER S/A		1	
31	942298	PLUNGER & GUIDE S/A -11 DESIGN		1	
	401606	GUIDE -12 DESIGN		1	
32	▲ 153950	"O" RING		1	
33	942298	PLUNGER & GUIDE S/A -11 DESIGN		1	
	389541	PLUNGER -12 DESIGN		1	
34	▲ 401537	GLYD RING SEAL		1	
35	▲ 154004	"O" RING		1	
36	390308	SPACER (2000 PSI UNIT ONLY)		1	C, F
37	2281	SPRING		1	
38	290057	PISTON		1	
39	92733	RETAINING RING		1	
40	379947	SEAT		1	
41	▲ 154005	"O" RING		1	
42	379948	CHECK VALVE		1	
43	113559	SPRING		1	
44	375745	WASHER		1	
45	1031	SCREW		4	A, B, C
	1073	SCREW		4	D, E, F
46	88954	RETAINING RING		1	
47	281670	FILTER SCREEN		1	
48	346344	PLUG		1	
49	▲ 154124	"O" RING		1	
50	401605	NEEDLE VALVE		1	
51	7076	PLUG		1	
52	292564	RESTRICTION PLUG		1	D, E, F

FIGURE 1. REMOTE ELECTRICALLY OPERATED RELIEF VALVE,
EXPLODED VIEW. (Cont'd)

INDEX NO.	PART NO.	NOMENCLATURE	QTY.	USABLE ON CODE
53	285601	SEAT	1	
54	113000	PLUG	1	
55	7074	PLUG	1	
56	277596	PLUG	1	
57	113000	PLUG (-11 DESIGN)	1	
	346344	PLUG (-12 DESIGN)	1	
58	▲ 154124	"O" RING (-12 DESIGN)	1	
59	7075	PLUG	1	
60	389540	COVER (CGE-06-1*)	1	A, B, C
	389539	COVER (CGE-10-1*)	1	D, E, F
61	▲ 199813	"O" RING	1	A, B, C
	▲ 170160	"O" RING	1	D, E, F
62	▲ 175943	"O" RING	1	
63	▲ 154139	"O" RING	1	
64	2077	SPRING	1	A, C
	291822	SPRING	1	D, F
	291821	SPRING (HI-VENT)	1	E
65	184458	SPRING (HI-VENT)	1	B
66	343154	PISTON	1	A, B, C
	379942	PISTON	1	D, E, F
67	343153	SEAT	1	A, B, C
	379941	SEAT	1	D, E, F
68	201408	ROLLPIN	1	
69	7075	PLUG	2	
70	381318	RESTRICTION PLUG	1	A, B, C
71	▲ 154000	"O" RING	1	A, B, C
72	160571	ROLLPIN	1	
73	374126	BODY	1	A, B, C
	377006	BODY	1	D, E, F
	▲ 919696	GASKET KIT	1	

FIGURE 1. REMOTE ELECTRICALLY OPERATED RELIEF VALVE
EXPLODED VIEW.

SECTION I - INTRODUCTION

1-1. **REFERENCE MATERIAL.** Installation dimensions are not contained in this manual. Refer to installation drawing 511030 for that information.

1-2. **KITS.** Gasket kit 919696 contains all the seals necessary to service the units. It is recommended that "O"rings and gaskets be replaced at each overhaul.

SECTION II - OVERHAUL

2-1. UNIT REMOVAL.

WARNING

Turn off all electrical power and relieve hydraulic pressure. Block any load that could generate pressure.

- A. Remove the unit from the system.
- B. Cap all system openings to prevent contamination.

2-2. **SPECIAL TOOLS.** The following special tools are required:

- A. Torque wrench rated in LBS.IN. range 0-100.
- B. Test stand mounting plates. Vickers part CGEM-06-10 (Use for Model CGE-06) CGEM-10-10 (Use for Model CGE-10).
- C. Power supply rated at: Input 115AC50/60 Hz: Output 0-400 DC MA. Vickers EMCS-C-BB-10 Power Supply part number 750897.
- D. Milliammeter rated at 0-500 DC MA.
- E. Test stand capable of providing the required hydraulic flow. See Section III, Test Procedure.
- F. 0.010 and 0.002 stainless steel shim stock or feeler gage.
- G. Depth micrometer capable of measuring 1 to 2 inches or flapper alignment tool part number 942300 (available from Vickers). Tool details are included in this manual. See Figure 5.

2-3. **IMPROVISED TOOLS.** No improvised tools are required for overhaul.

2-4. **DISASSEMBLY.** Periodic maintenance of the valve will generally not require disassembly to the extent described here. However, the sequence can also be used as a guide for partial disassembly. In general, disassembly is accomplished in the item number sequence shown in Figure 1. Special procedures are included in the following steps:

NOTE

Discard and replace all "O"rings removed during disassembly.

- A. Thoroughly clean the exterior of the valve.
- B. The valve is full of fluid, so hold it over a container when the cover (10, Figure 1) is removed.
- C. Remove parts (1) thru (19) according to numerical sequence except, loosen screw (14) to allow the compressed spring (18) to be relieved gradually.
- D. Slide the coil (25) over the nozzle (20) and

use a 5/16 open end wrench to remove nozzle (20). Turn nozzle counter-clockwise to remove.

CAUTION

Do not pull the wires when removing coil bushing (25) and "O"ring (26) from cover (60).

E. Remove parts (21) thru (29) and (31) thru (38). Screw (22) and nut (23) need not be removed from frame (24) unless screw threads show evidence of damage.

NOTE

Spacer (36) is used only in units Model CGE-06/10-2-002-1*.

F. Remove parts (39) thru (44). The operation of the check valve may be determined by observing the action of the spring. Use a suitable tool to depress the check valve (42) and let it return against the seat.

G. Remove four (4) screws (45) and separate pilot cover from body (73).

CAUTION

Do not clean filter screen (47) with a metal scribe or pick.

H. Remove parts (46) thru (59) from cover (60). Restriction plug (52) is used on CGE-10 units only.

J. Remove and discard "O"rings (61) thru (63).

K. Remove parts (64) thru (67). Spring (65) is used only in units Model CGE-06-3V-002-1*. Do not remove seat (67) unless inspection of piston (66) reveals damage to the piston seating surface.

NOTE

Do not remove rollpin (72) in the following step unless damaged. The mounting surface can be scored during removal. If removal is necessary, check surface for burrs and flatness before installation of a new rollpin.

L. Remove parts (68) thru (72) from body (73).

2-5. **CLEANING.** All parts must be thoroughly cleaned and kept clean during inspection and assembly. The close tolerance of the servoportion of the valve makes this requirement more stringent than usual. Clean all removed parts, using a commercial solvent that is compatible with the system fluid. Compressed air may be used in cleaning the valve, but it must be filtered to remove water and contamination. Clean compressed air is particularly useful in cleaning the spool orifices and body passages.

CAUTION

Do not stone edges of plunger (33, Figure 1) or piston (66).

2-6. **INSPECTION, REPAIR, AND REPLACEMENT.** Check that all internal passages are clean and unob-

structed. Examine all mating surfaces for nicks and burrs. Minor nicks and burrs can be removed with an India stone or crocus cloth. If unit has operated in a contaminated system, all internal passages of cover (60) must be thoroughly flushed with clean solvent.

CAUTION

Reliable operation throughout the specified operating range is assured only if genuine Vickers parts are used. Sophisticated design processes and material are used in the manufacture of our parts. Substitutions may result in early failure.

A. Inspect nozzle (20) for damaged threads. Replace the part if threads are damaged. Inspect the orifice face of nozzle for evidence of nicks or scratches. If the orifice size is distorted, or face is eroded, replace the part.

NOTE

Two nozzle sizes are available:

1. 0.047 inch diameter hole for CGE-06/10-3 and 3V
2. 0.055 inch diameter hole for CGE-06/10-2

B. Inspect all screws for evidence of damaged threads. If threads are damaged, replace the screws.

C. Inspect the flapper subassembly (17) for fractured tines, distortion, and loose rivets. If rivets are loose, replace the part. If tines are fractured, replace the part. If part is distorted, straighten and square up damaged portion. If the top of flapper is nicked or burrs are evident around the rivets, remove the nicks and burrs using an India stone. Finish the repair by polishing the top of the flapper using 500 grit paper placed on a flat surface.

D. Inspect springs (18, 37, 43, 64, and 65) for damaged coils. Replace springs if coils are damaged. Inspect springs for distortion. The ends of the springs shall be parallel to each other. Replace springs if distorted.

E. Inspect frame (24) for distortion. Correct to a square condition. Inspect adapter S/A (29) for evidence of damage. Replace part if threads are damaged.

F. Perform a continuity test on coil (25). Resistance values should range from 18 to 22 ohms. This test is superficial but a more rigorous test requires special equipment. Replace coil if it does not meet the established standard.

G. If a new plunger (33) is required, use a three (3) cornered India stone to break the feather edge of balancing grooves. Use 500 grit polishing paper lightly on the outside diameter of plunger. Wash the plunger in clean solvent.

H. If seat (67) was removed, make sure hole in body is clear.

J. Ascertain that both the drain hole and balance hole in piston (66) is clear.

K. Inspect mounting surfaces of cover (10), adapter S/A (29), cover (60), and body (73) for evidence of nicks and scratches. Remove nicks and scratches using an India stone and/or polishing paper.

NOTE

Use polishing paper on a clean, flat surface.

2-7. ASSEMBLY. Replace the gaskets and "O" rings removed from the unit with those supplied in the gasket kit part number 919696. Lubricate "O" rings and parts, using clean system fluid to facilitate assembly. Assembly of the parts will be in the reverse numerical sequence. Special procedures are included in the following steps:

A. Install parts (72) thru (68) in body (73). See Figure 1. Restriction plug (70) and "O" ring (71) are used on Model CGE-06. Restriction plug and "O" ring must be installed in the port located on the centerline of body (73). If the parts are installed in the wrong port, the pilot drain will be restricted and failure may result.

B. Install parts (67) thru (64). Spring (65) is used only in Model CGE-06-3V-002-1*. If seat (67) was removed, install new seat. See paragraph 2-4. K.

NOTE

Slide piston (66) back and forth in the body. Make sure the movement is free and without bind.

C. Install "O" rings (63) thru (61).

NOTE

In the following step, deviate slightly from the item number sequence by connecting cover (60) to body (73). This provides a unit which is easier to assemble.

D. Install filter screen (47) and retaining ring (46) into cover (60). See Figure 1. Secure cover (60) to body (73) using screws (45). Tighten screws securely. Use a suitable tool to cause piston (66) to move. The movement must be free without evidence of bind. If piston bind occurs, loosen screws (45) and reposition cover or body. Tighten screws (45) and recheck piston movement.

E. Install parts (59) thru (51) into cover (60). Install seat (53) with hole in the outside diameter pointing toward nameplate (4). Refer to cross-section view (Figure 1). Restriction plug (52) is used on CGE-10 models only.

F. Install parts (50) thru (48). Thread the needle valve (50) into the cover (60) to a depth of 11/16 inch (0.687) below surface of cover (60). Install plug (48) with "O" ring (49) hand tighten into cover. Final adjustment of needle valve will be made during test, paragraph 3-2.

G. Install parts (44) thru (39) if they were removed. Lubricate "O" ring (41) before assembling it on seat (40). Depress check valve to verify action. No binding should occur.

H. Install parts (38) thru (27). Place cover (60) on its side to gain access to piston (38) bore.

1. Assemble piston (38) and spring (37) and install into bore.

2. Reposition cover (60) to obtain vertical bore

position.

3. Lubricate plunger (33) and install into bore as shown in Figure 1. Rotate plunger through 360° while moving in and out. This checks the concentricity of the spool and the cover. No binding should occur. Remove the plunger.

4. If spacer (36) is used (Models CGE-06/10-2), remove rough edges from outside diameter of spacer with an India stone. Place spacer (36) in the bore. Seat the spacer with plunger (33). Refer to Figure 1 cross section view. Remove plunger from bore.

5. Install "O" ring (35) and glyd ring (34) on plunger (33). Install "O" ring (32) on guide (31). Assemble guide over plunger (33) chamfered edge first.

6. Insert plunger (33) and guide (31) into bore as an assembly.

7. Install adapter S/A (29) to cover (60). Use lockwasher (28) and screw (27). Orient adapter (29) so check valve opening is not covered. Hand tighten both screws.

J. Assemble pilot stage parts (26) thru (14) refer to Figures 2 and 3 as required.

1. Assemble screw (22) to frame (24) and attach nut (23). Nut is self-locking type. Tighten nut until all end play is removed, but screw and nut together must be free to turn.

2. Thread screw (14) thru washers (15) and (16) approximately two (2) turns into frame (24).

5. Insert nozzle (20) thru frame (24) and thread it into cover (60). Use a 5/16 open end wrench to tighten the nozzle securely.

6. Tighten screws (21) to secure frame against cover (60).

7. Position adapter S/A (29) to prevent plunger (33) bind, and tighten screws (23) securely.

8. With frame (24) and adapter S/A (29) tightened to cover, adjust screw (22) until the frame, onto which flapper (17) mounts, is square to cover surface.

9. Assemble coil (25) over nozzle (20) with coil wires toward cover (60). Use retaining ring (19) to secure coil (25).

10. Position flapper subassembly (17) over nozzle and coil onto frame (24). See Figure 2. Tighten screws (14) to a snug condition.

NOTE

The flapper to nozzle adjustment is very critical. Two methods may be used to accomplish this adjustment. The first method shown is more involved and requires familiarity with measuring equipment. The second method utilizes a special flapper alignment tool part number 942300. This tool is available from Vickers at a nominal cost. Tool assembly prints are shown

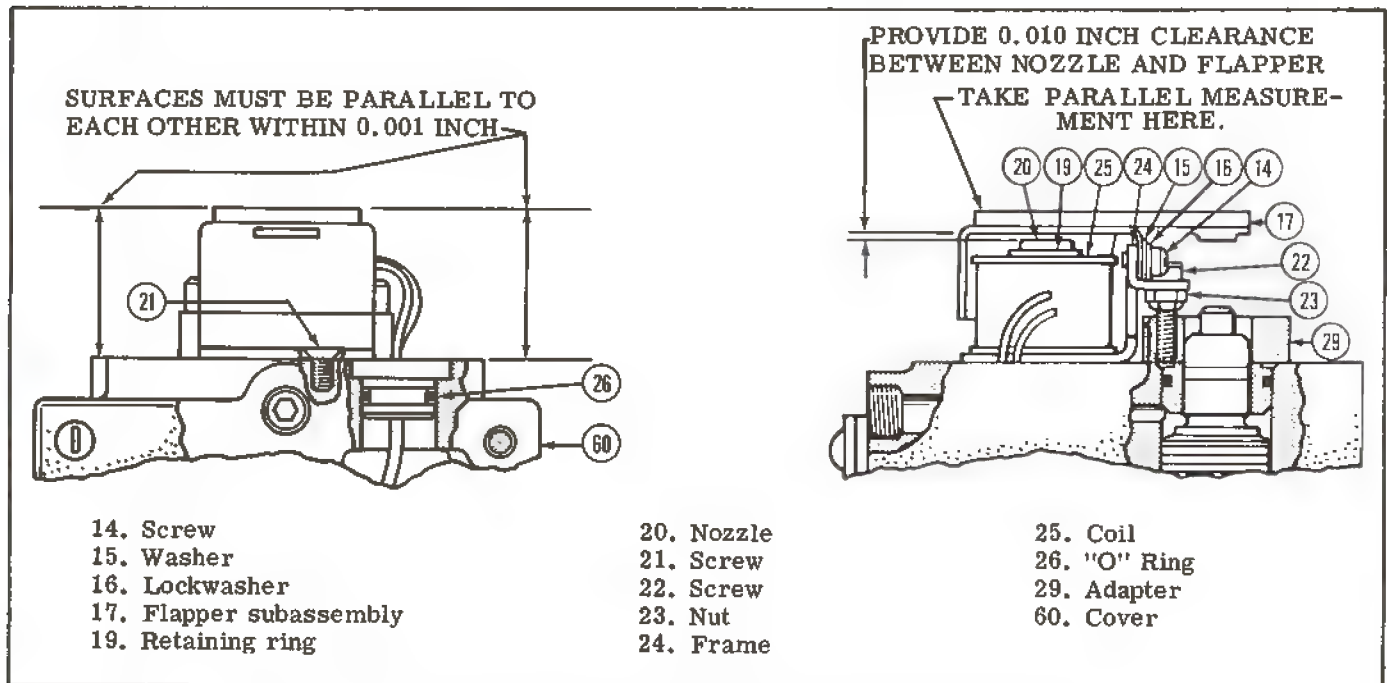


FIGURE 2. PRELIMINARY FLAPPER TO NOZZLE ADJUSTMENT

3. Assemble "O" ring (26) on bushing of coil (25). Thread leads of coil thru access hole in cover (60). Press the bushing with the "O" ring into the counter bored hole. Refer to Figures 2 and 3 for proper orientation of bushing. Wires must be positioned as shown to prevent interference with cover.

4. Thread screw (22) into adapter (29) approximately seven (7) to seven and one-half (7-1/2) turns. This will cause the frame (24) and cover (60) to interface. Make certain frame is flat against the cover. Loosely secure frame (24) to cover (60). Use screws (21).

in Figure (5) for the customers convenience.

11. Method 1. Flapper to nozzle alignment procedure.

a. Provide sufficient clearance between nozzle and flapper for insertion of a 0.010 inch shim between these two parts. Using a depth micrometer, measure the distance between the top of the flapper and the machined surface of the cover as shown in Figure 2. The top of flapper (17) and the machined surface of cover (60) must be adjusted parallel within 0.001 inch.

The flapper will probably have to be adjusted several times before the parallel condition is realized. The clearance of 0.010 inch must be maintained during this exercise.

b. Tighten screws (14) securely. Recheck parallel condition then remove the 0.010 shim.

c. Install spring (18) between flapper sub-assembly (17) and plunger (33). See Figure 3.

d. Insert a 0.002 inch shim between nozzle (20) and flapper subassembly (17). Adjust screw (22) to provide the required clearance. See Figure 3. Final adjustment will be made during test paragraph 3-3. Use a 3/32 (0.093) inch Allen wrench for screw (22). Remove 0.002 shim and Allen wrench.

12. Method 2. Flapper to nozzle alignment procedure.

NOTE

Remove any burrs or paint from the surface of cover (60).

a. Install flapper alignment tool (942300) as shown in Figure 4. Use the two 208569 screws provided.

b. Provide clearance between the nozzle and flapper. Insert a 0.010 inch shim between these parts. Rotate adjustment tool knob. The plunger will move inward and engage the flapper.

c. Loosen screws (14) which hold the flapper to the frame. The flapper will align with the plunger face.

d. Tighten screws (14) securely.

e. Remove flapper alignment tool and shim stock.

f. Install spring (18) between flapper sub-assembly and plunger (33).

g. Insert a 0.002 inch shim between the flapper subassembly (17) and the nozzle (20). Adjust screw (22) to provide the correct clearance. See Figure 3. Final adjustment will be made during test paragraph 3-3. Remove the shim stock.

13. Assemble parts (13) thru (9). Tighten screws (9) to a torque value of 35 to 40 pound inches. Hand tighten screw (11).

14. Install "O" rings (1) and (2). Parts (3) thru (8) will be installed after the unit has been tested as outlined in Section III.

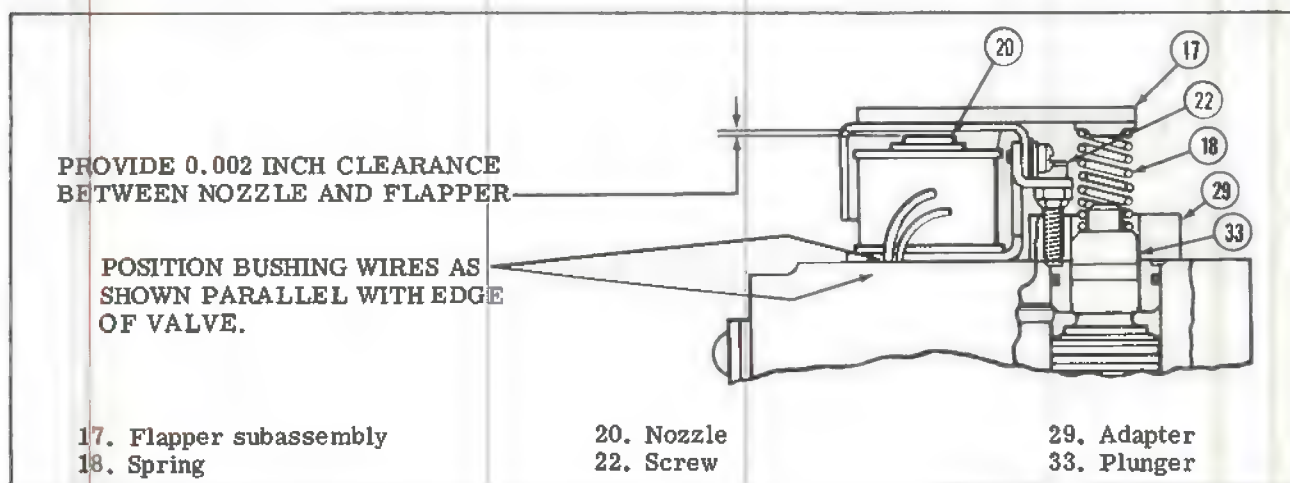


FIGURE 3. DETERMINING FLAPPER TO NOZZLE CLEARANCE

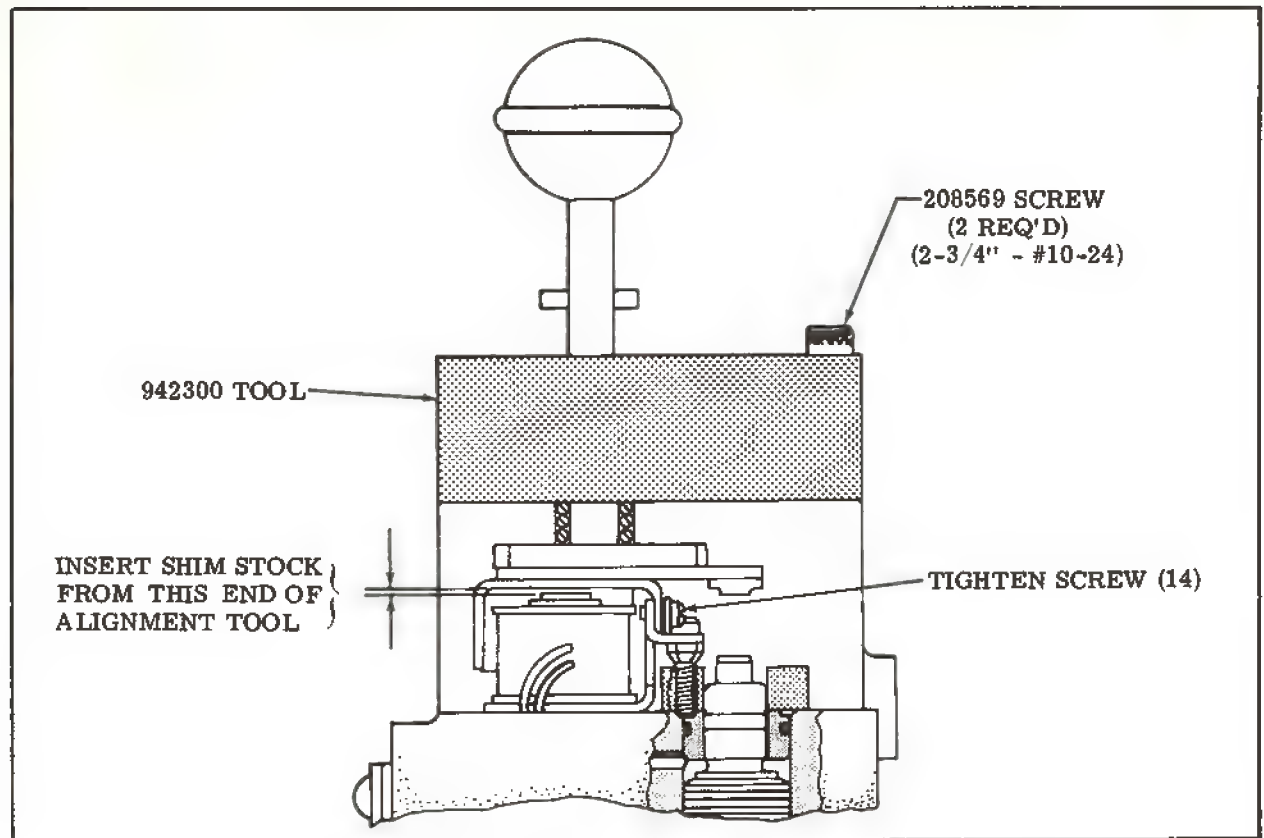


FIGURE 4. INSTALLATION OF FLAPPER ALIGNMENT TOOL (942300).

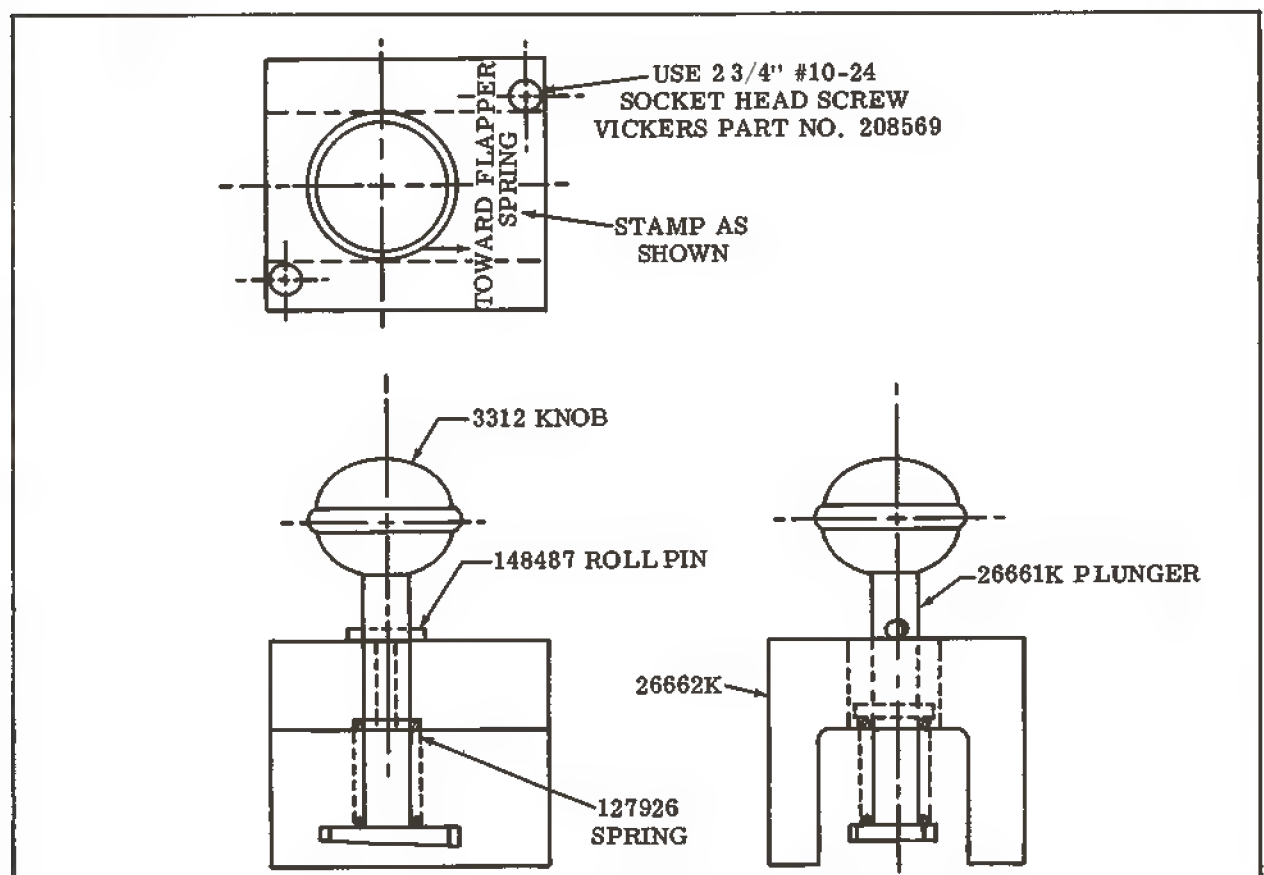
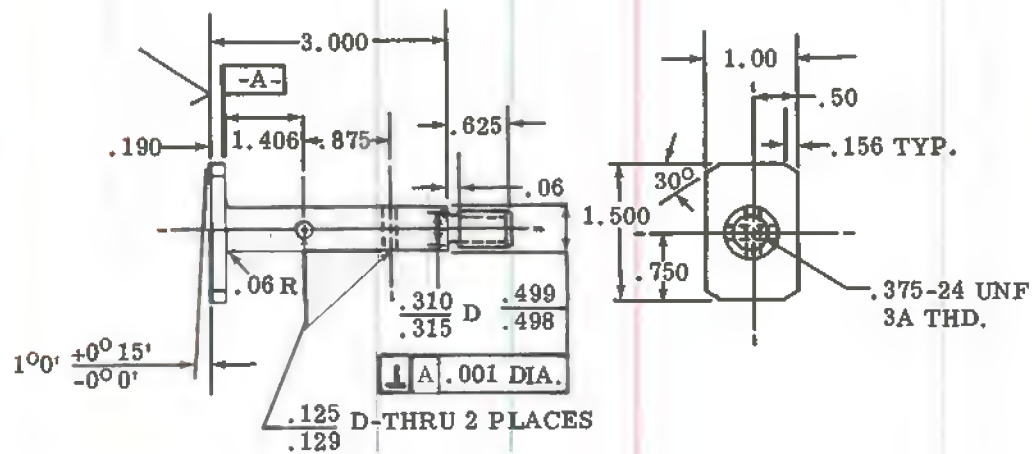
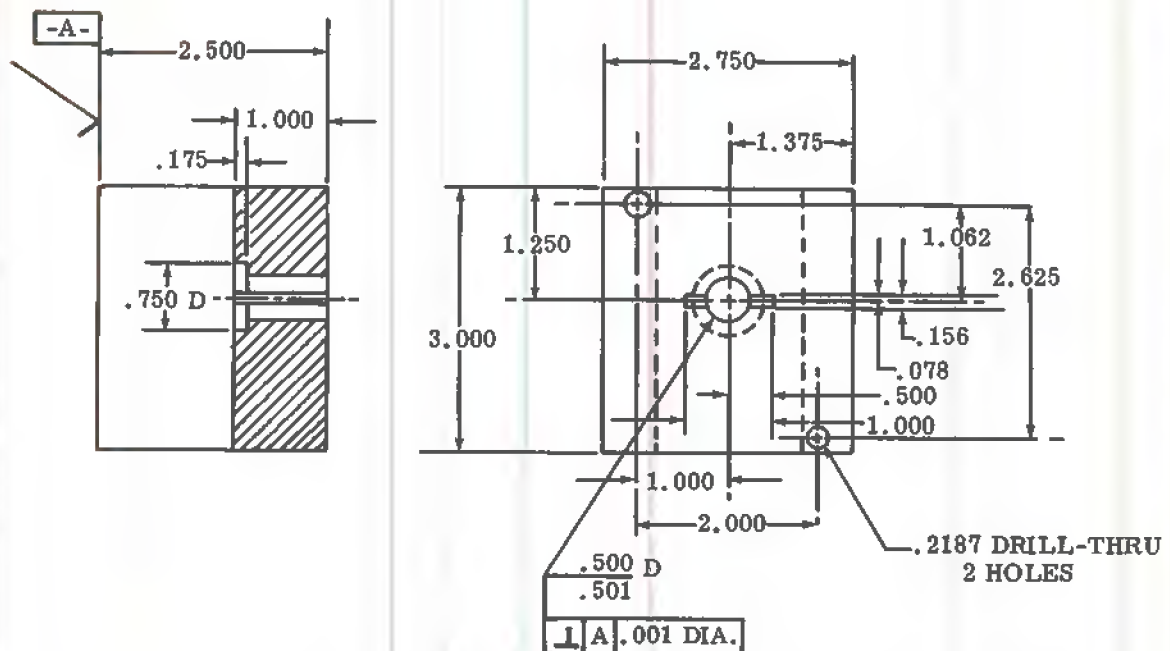
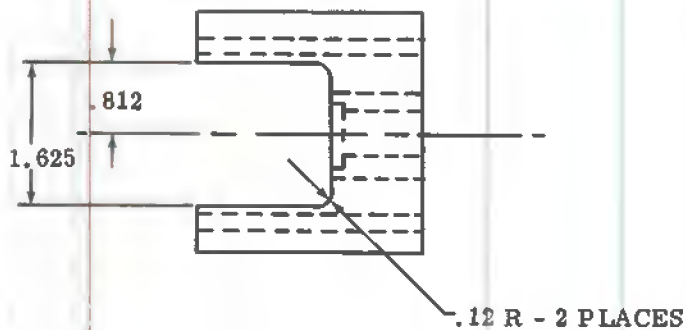


FIGURE 5. ASSEMBLY, 942300 FLAPPER ALIGNMENT TOOL.



PLUNGER 26661 K MAT'L -CARBON STEEL (1018)



BLOCK FIXTURE 26662 K MAT'L 4150-6150 STEEL ROCKWELL "C" 50 MIN.

FIGURE 5. DETAILS FOR 942300 FLAPPER ALIGNMENT TOOL.

SECTION III - TEST PROCEDURE

TEST CONDITIONS

Hydraulics:

Fluid Medium	DTE light oil or equivalent
Fluid Temperature	120 \pm 5° F
Maximum Pressure	2500 PSI CGE-06/10-2-002 -1*. 3500 PSI CGE-06/10-3-002 -1*.
Test Volume	Use 18 GPM for the CGE-06 and 28 GPM for CGE-10.

Electrical:

An adjustable current source from zero (0) to 400 milliamperes (MA) is required. Vickers EMCS-C-BB-10 Power Supply part number 750897 is recommended. Installation information for the EMCS is shown on drawing 521550.

3-1. TEST.

NOTE

Systems using proportional filtration tend to contaminate the pilot valve orifice. An external full flow filter for the pilot stage oil may be used. Units having the external full flow feature are designated by an -S3 suffix added to the model code. -S3 units have the pilot pressure inlet passage of the main stage body plugged. Pressurized oil can be obtained from one of the gage connections, (plug 69 Figure 1), or from another source in the system. After filtering externally, the oil line connects at plug location (55) Figure 1. This directs filtered oil to the pilot stage of the CGE valve. To clarify, -S3 in the model code indicates only that the body is plugged. The external filtration system is the users responsibility.

A. Before mounting the assembled valve for test, manually move piston (66, Figure 1) to full stroke with a screwdriver or similar tool. If piston (66) hangs up or binds, refer to paragraph 2-7. D.

NOTE

Gasket mounted units require a suitable subplate. A CGE subplate properly piped is recommended. See Figure 6. If the valve is replacing a standard CG-** valve, on a standard CG-** subplate, it must be externally drained. Remove external drain plug (59, Figure 1) and install a pipe directly to tank.

NOTE

A sample hydraulic and electrical circuit is shown in Figure 7. Modify an existing test stand or obtain necessary components to assemble the test circuit.

B. Connect valve to the test circuit and attach power supply (13, Figure 7). The connections can be made without regard to polarity.

C. Set dither adjustment on power supply (13) to minimum.

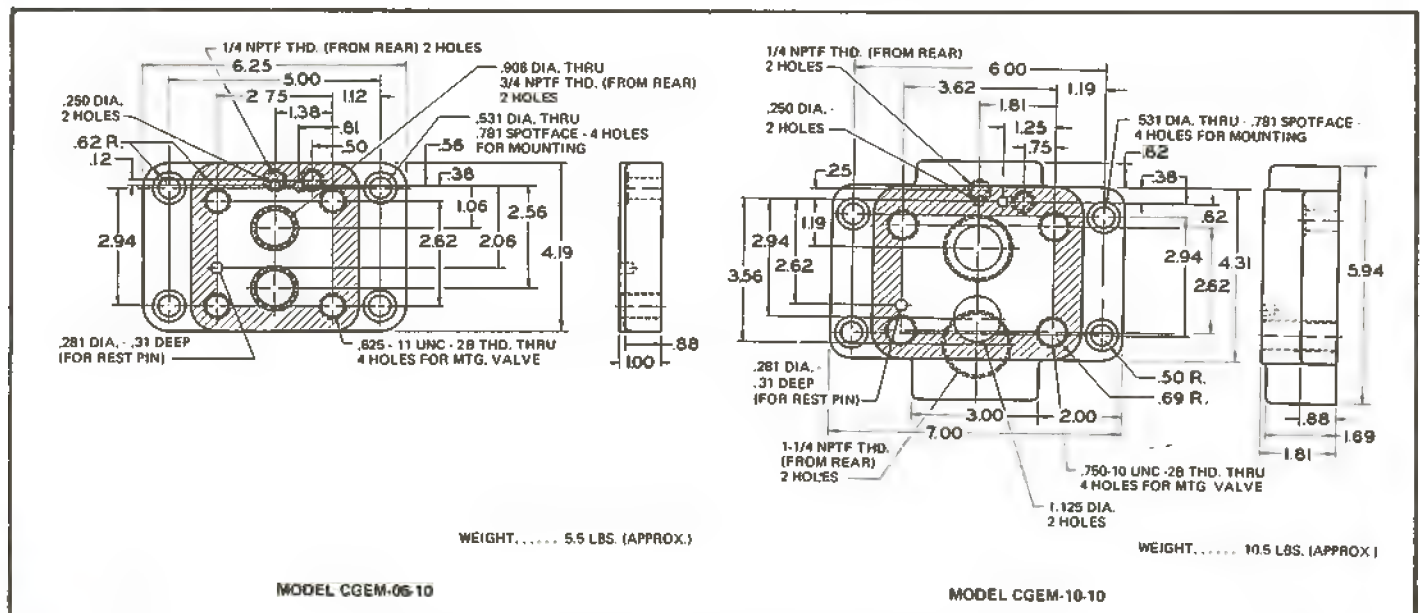
D. Turn power supply current control knob to zero (0).

CAUTION

In the following step, if milliammeter (12) reads in reverse, reverse the meter connecting wires.

E. Refer to sample test circuit Figure 7. during the following steps:

1. Open globe valve (1).
2. Close globe valve (10).
3. Close needle valve (9).



6. Open globe valve (10).

Pressure gage (8) must read below the min-



5. Adjust screw (22, Figure 1) until a minimum

pressure of 140 PSI is obtained.

6. Open globe valve (1, Figure 7) close globe valve (10) and remove the adjustment wrench from the valve cover. Hand tighten screw and seal (11, 12, Figure 1) into the cover.

7. Open globe valve (10, Figure 7) close globe valve (1). Verify the minimum pressure reading.

8. Close needle valve (9).

3-4. LINEARITY CHECK AND ADJUSTMENT.

NOTE

The high and low pressure adjustments interact, therefore, more than one high and low pressure adjustment may be required before linearity (tracking) occurs.

A. Cycle valve from zero (0) current to full current (400MA) five (5) times.

B. Check pressure gage (7) for maximum pressure at 400 MA. Reduce current to zero (0) and check the low pressure setting. Repeat the high and low pressure adjustment procedure (paragraph 3-2 and 3-3) until correct pressures are obtained.

C. Tighten plug and "O" ring (48, 49, Figure 1). Tighten screw and seal (11, 12).

D. Slowly apply current to the valve under test until 200 PSI is reached. The current reading shall not

exceed the MA shown in Table 2. Continue to apply current until the PSI shown in Table 2 is obtained. Current at this point shall be 220 ± 20 MA. Continue the application of current until 400 MA is read on the milliammeter then reduce current slowly until the PSI shown in Table 2 is reached. The current shall be within 25 MA of previous reading. Return current control knob to zero (0). During application and removal of current, there must be no erratic pressure fluctuations or excessive noise in the valve.

MODEL	MA	PSI
CGE-06/10-2*-002-11/12	120	1000
CGE-06/10-3*-002-11/12	75	1500

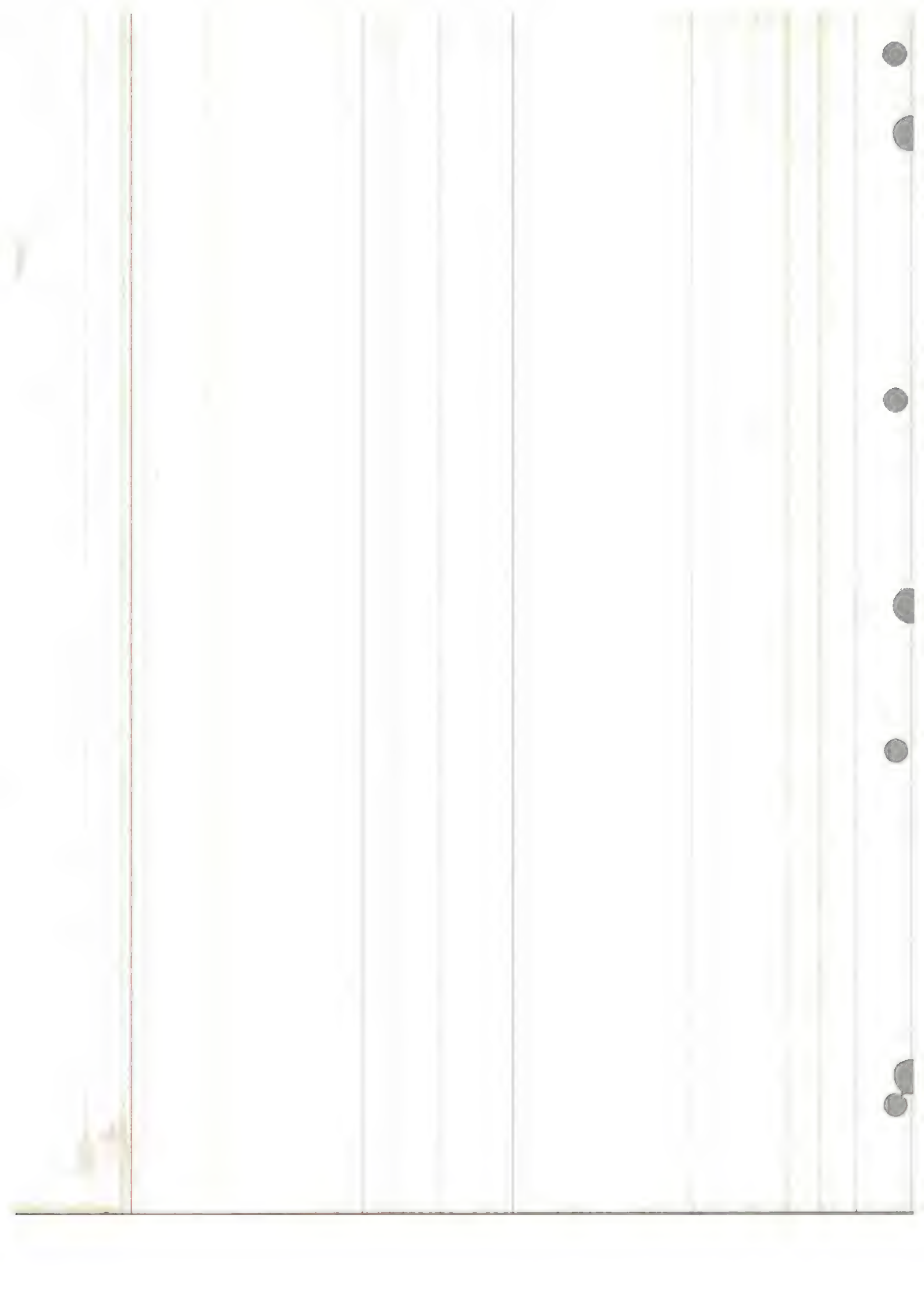
Table 2. Current Vs. Pressure - 2000/3000 PSI Valves

3-5. Turn off hydraulic power. Open globe valve (1) to relieve system pressure. Close globe valve (10).

3-6. Remove electrical wiring connections from the valve under test.

3-7. Remove valve from the test circuit.

3-8. After the unit has been successfully tested, install parts (8, Figure 1) thru (3). The coil wires must be secured by clamp (8) and screw (7).



LITHO IN U.S.A.

VICKERS®

A TRIMONA COMPANY

1

**ELECTRICALLY
MODULATED
RELIEF VALVE**

(F3)-CGE-06-3(V)-2* (S*)

(F3)-CGE-10-3(V)-2* (S*)



Vickers, Incorporated

P.O. Box 302
Troy, Michigan 48007-0302

Revised 10-1-87

I-3363-S

TABLE OF CONTENTS

Section		Page
I	INTRODUCTION	
	A. Purpose of Manual	1
	B. General Information	1
II	DESCRIPTION	
	A. General	1
	B. Application	1
III	PRINCIPLES OF OPERATION	
	A. Electrically Modulated Pilot	3
	B. Intermediate Body	4
	C. Main Stage	4
	D. Theory of Operation	4
IV	INSTALLATION AND OPERATING INSTRUCTIONS	
	A. Installation Drawings	4
	B. Mounting	4
	C. Piping and Tubing	4
	D. Hydraulic Fluid Recommendations	4
	E. Cleanliness	4
V	INSPECTION AND MAINTENANCE	
	A. Service Tools	5
	B. Special Tools	5
	C. Inspection	5
	D. Adding Fluid to System	5
	E. Adjustments	5
	F. Lubrication	5
	G. Replacement Parts	5
	H. Trouble Shooting	5
VI	OVERHAUL	
	A. General	7
	B. Unit Removal	7
	C. Disassembly	7
	D. Cleaning	7
	E. Inspection, Repair, Replacement	8
	F. Assembly	8
VII	TEST PROCEDURE	
	A. Test Conditions	15
	B. Electrical Specifications	15
	C. Test	15
	D. Manual Adjustment Test	15
	E. Electrical Pilot Adjustment	16

MODEL CODE BREAKDOWN

(F3)- C G E - ** - 3 (V) - 22 (S*)

SEALS FOR MINERAL
OIL AND FIRE
RESISTANT FLUIDS

RELIEF
VALVE

SUBPLATE
MOUNTED

REMOTE
ELECTRICALLY
MODULATED

VALVE SIZE
06 - 60 SERIES
(3/4" NOM.)
10 - 100 SERIES
(1-1/4" NOM.)

S6 - EXTERNAL 35 MICRON PILOT
FILTER (FURNISHED BY
CUSTOMER)
S7 - VITON SEALS WITH 35 MICRO N
FILTER (EARLY MODELS)
S8 - VITON SEALS ONLY
(EARLY MODELS)

DESIGN

"V" - OPTIONAL HIGH VENTING
FEATURE. OMIT IF NOT
REQUIRED. (FOR 3000 PSI
(210 bar) PRESSURE MODELS
ONLY)

PRESSURE RATING
(PSI MAXIMUM)
1 - 1000 (70 bar)
3 - 3000 (210 bar)

TABLE 1. MODEL CODE

Section I - INTRODUCTION

A. PURPOSE OF MANUAL

This manual describes the basic operational characteristics, provides service and overhaul information for the Vickers CGE-06/10-*22-(S*) Remote Electrically Modulated Relief Valves.

The information contained herein pertains to the latest design series as listed in Table 1.

B. GENERAL INFORMATION

1. Related Publications - Service parts information and installation dimensions are not contained in this manual.

The parts and installation drawings listed in Table 2 are available from any application office or from:

Vickers, Incorporated
Technical Publications
1401 Crooks Road
Troy, Michigan 48084

2. Model Codes - Variations within each basic model series are covered in the model code. Table 1 is a complete breakdown of the code covering these units. Service inquiries should always include the complete unit model code number as stamped on the nameplate.

MODEL SERIES	PARTS DRAWING	INSTALLATION DRAWING
CGE-06-*22-(S*)	I-3695-S	511040
CGE-10-*22-(S*)	I-3696-S	511040

Table 2.

Section II - DESCRIPTION

A. GENERAL

Assembly of a typical remote electrically modulated relief valve is shown in figure 1. In general, the valve consists of three basic parts, a main stage, an intermediate body and the electrically modulated pilot. The main stage is similar to the standard relief valve. The intermediate body contains standard relief valve pilot parts to provide manual adjustment and has a mounting pad which accepts CETOP3 components. The electrically modulated pilot is machined to fit the CETOP3 pad and contains a flapper valve assembly, a blocking valve, and a ball type check valve.

B. APPLICATION

The new valve series provides a self-contained unit

that modulates system pressure electrically over a wide range without external feedback devices.

The valve has the ability to control system pressure from any distance or location. Modulating signals may be derived from potentiometers, analog computers, power supplies or any other source that will provide the necessary drive current for the pilot stage. A current of 0-500 milliamperes (mA) is required to modulate the valve.

Power supply EMCS-*30 was specifically designed for control of this type valve. The EMCS is not limited to potentiometer command only but can easily be adapted to remote control devices. For information on EMCS, refer to installation drawing 521557.

from Technical Publications, Troy, MI 48084.

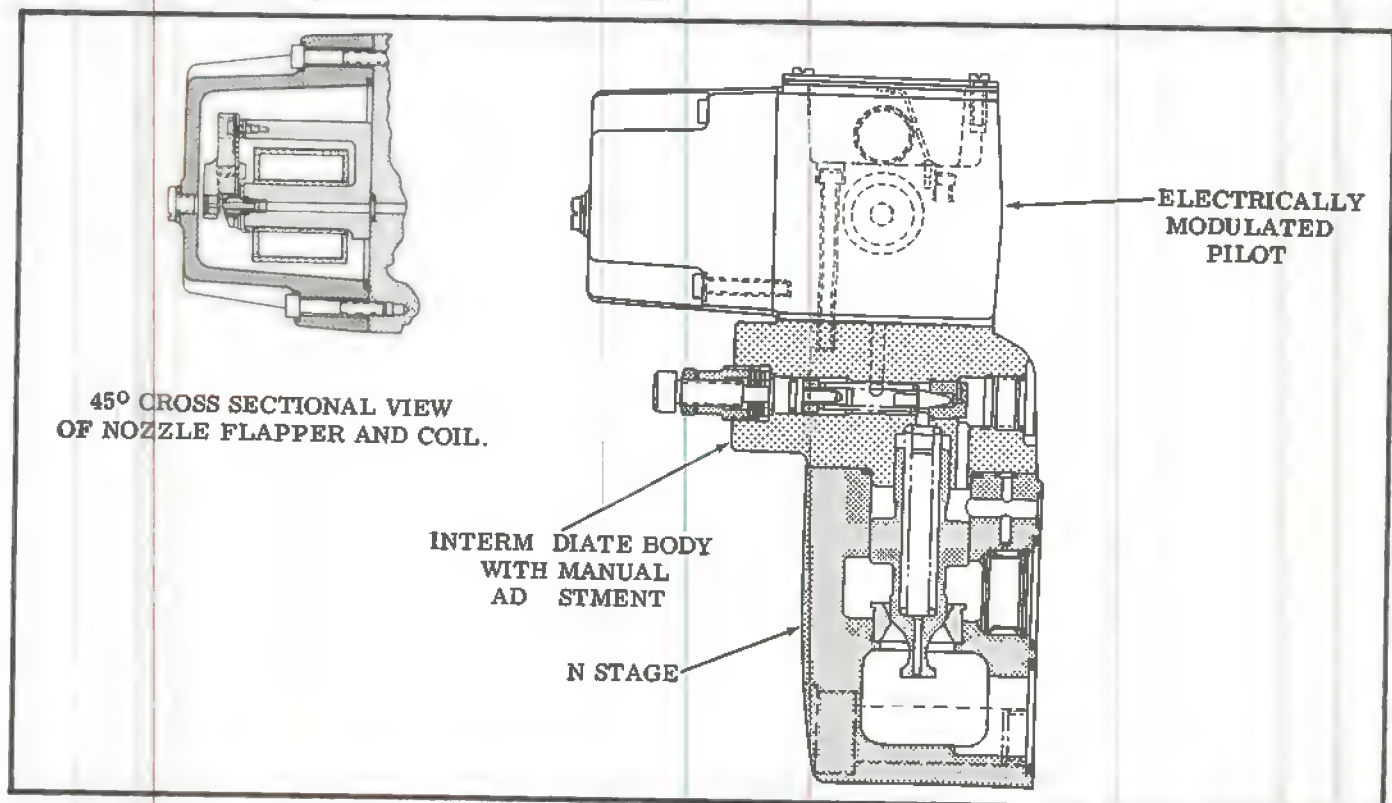


Figure 1. Remote Electrically Modulated Relief Valve Assembly.

Section III - PRINCIPLES OF OPERATION

A. ELECTRICALLY MODULATED PILOT

1. **FLAPPER, NOZZLE AND COIL:** The flapper nozzle is analogous to a poppet/seat with a spring type of control in that it is a force balance system. When current is applied to the coil, the resultant magnetic force pulls the flapper toward the pole piece. This results in a smaller hydraulic gap (orifice) and a build up of pressure at the upstream side of the valve. This increasing pressure produces a force which opposes the magnetic force and a balance is achieved with pressure being approximately proportional to current. Refer to figure 2.

2. **DUAL GAP CONCEPT:** The hydraulic and magnetic gaps are both adjustable. This allows optimum trim of both gaps with a resulting improvement in stability and contamination tolerance.

3. **DAMPENING SHIM:** The dampening shim prevents flapper oscillations. It is not used in 3000 PSI models.

4. **BLOCKING VALVE:** The blocking valve is used to shut off flow to the flapper nozzle. This allows complete manual control during machine flushing and

at start-up. To close the valve, shutdown the machine and relieve all pressure. Remove the blocking valve access plug from the side of the pilot valve body. Remove and reverse the button. When the access plug is reinstalled, the spool shifts and flow is blocked to the nozzle.

5. DRAIN CONNECTION

CAUTION

The pilot valve drain connection must be piped directly to the reservoir and terminate below the oil surface. A 0.5625-18, UNF-2B straight thread port, (for 3/8" tubing), is provided on the side of the pilot valve for this purpose.

6. **SECONDARY FILTER SCREEN:** A 100 micron screen located close to the nozzle helps prevent plugging of the flapper orifice. To change or clean this screen, remove the blocking valve spool. The screen is located in the end of the spool. See figure 2.

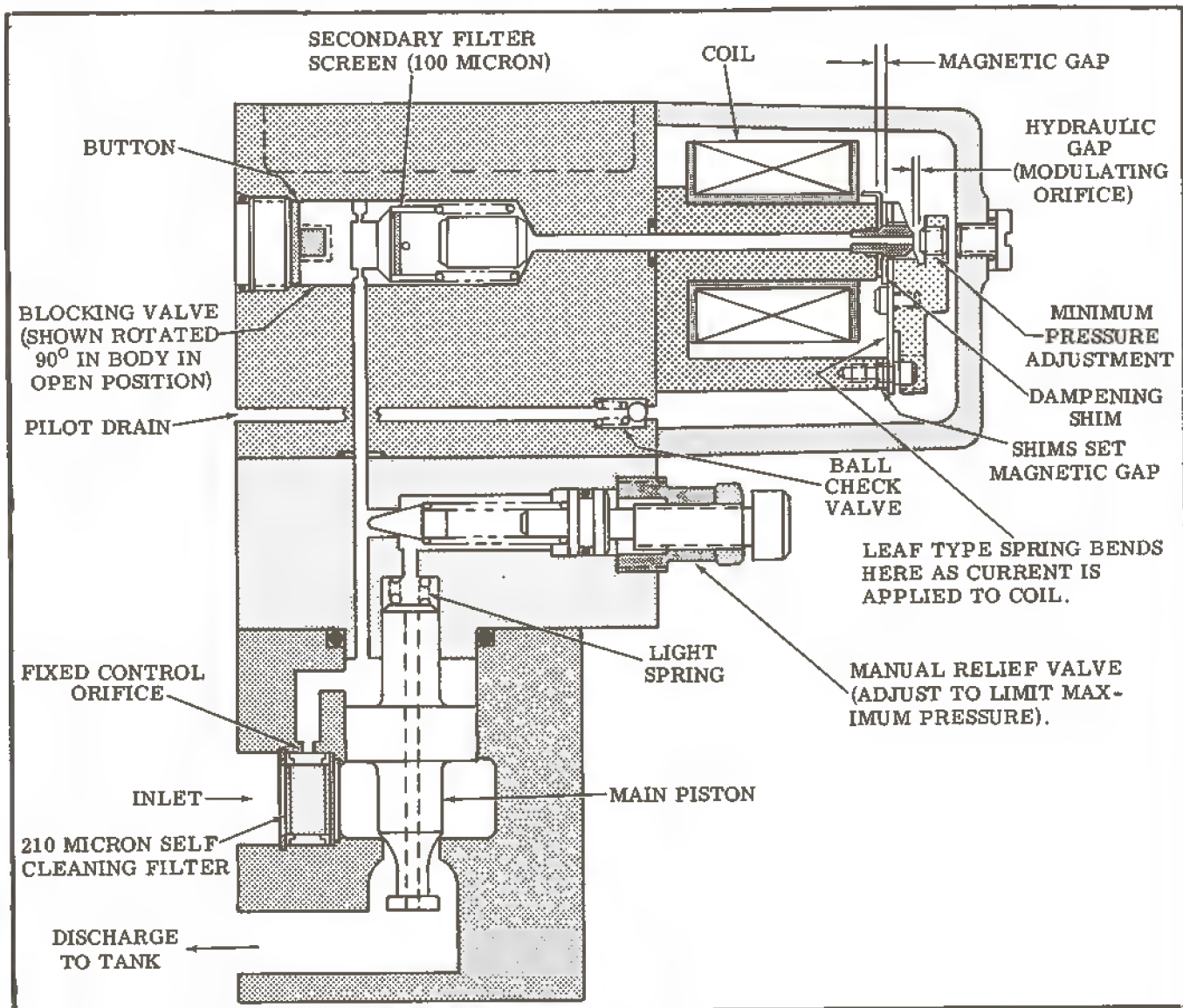


Figure 2. Complete Electrically Modulated Relief Valve Functional Diagram.

7. **BALL CHECK VALVE:** A ball check valve is used to keep the pilot valve cover full of oil during shut down. See figure 2.

B. INTERMEDIATE BODY

The intermediate body adapts the relief valve main stage to the electrically modulated pilot valve. A poppet and spring arrangement located in the intermediate body provides manual adjustment of relief pressure when the pilot valve is blocked. Normal operating procedure is to adjust the manual relief above the maximum pressure excursion of the electrically modulated pilot stage. This prevents interaction of the poppet and flapper and provides a manually adjusted upper limit for the valve.

C. MAIN STAGE

The main stage consists of a body, piston, spring (s), primary filter screen, and seat. A control orifice is drilled in the body instead of the piston. The primary filter screen (210 micron self cleaning type) protects the drilled orifice and pilot stage from contaminants.

D. THEORY OF OPERATION

NOTE

Refer to figure 2 during the following discussion.

When a new CGE valve is installed into a system and the system energized; oil will flow into the inlet of the CGE valve.

The light spring holds the main piston closed against the seat until pressure below the piston builds up to about 80 PSI. The 80 PSI pressure differential lifts the piston porting oil to the reservoir. Also, the

80 PSI will cause oil to flow through the self cleaning filter screen and the control orifice, filling the open area above the piston and the valve body passages. When the body passage to the flapper nozzle is filled, the orifice developed by the flapper and nozzle develops a back pressure at the top of the piston and increases the original 80 PSI to approximately 150 PSI. The oil will continue to flow through the orifices filling the pilot cover. Pressure builds up within the cover, lifts the 5 PSI ball check from its seat and oil flows past the check into the pilot drain. The valve may be unstable until air is displaced within the pilot cover. With a new valve this displacement of air should be accomplished within one or two minutes.

The following action will take place when coil current is increased.

1. The increased current strengthens the magnetic field and attracts the flapper with a greater force toward the nozzle.

2. The modulating orifice decreases in size increasing the pressure at the upstream side of the orifice. This increase in pressure is reflected back to the top of the spool and adds to the light spring force. A higher pressure is then required at the inlet port to lift the spool.

NOTE

It can be seen from the preceding discussion that the greater the coil current the higher the pressure developed by the valve. This condition must not be allowed to exceed the ratings of the valve. As a safety precaution, the manual adjust section of the valve can be set to this limit. Also, the electrical circuitry should be trimmed to limit the maximum pressure, (usually 500 milliamperes or less.)

Section IV - INSTALLATION AND OPERATING INSTRUCTIONS

A. INSTALLATION DRAWINGS

Installation dimensions are not contained in this manual. Refer to installation drawing 511040 for that information.

B. MOUNTING

No mounting restrictions exist. The valve may be oriented in either a horizontal or vertical position.

C. PIPING AND TUBING

1. All pipes and tubing must be thoroughly cleaned before installation. Recommended methods of cleaning are sandblasting, wire brushing and pickling.

NOTE

For instructions on pickling, refer to instruction sheet 1221-S.

2. To minimize flow resistance and possibility of leakage, only as many fittings and connections as are necessary for proper installation should be used.

3. The number of bends in tubing should be kept

to a minimum to prevent excessive turbulence and friction of oil flow. Tubing must not be bent to sharply. The recommended radius for bends is three times the inside diameter of the tube.

D. HYDRAULIC FLUID RECOMMENDATIONS

GENERAL DATA

1. Oil in a hydraulic system performs the dual function of lubrication and transmission of power. It constitutes a vital factor in hydraulic system, and careful selection of it should be made with the assistance of a reputable supplier. Proper selection of oil assures satisfactory life and operation of system components.

2. Data sheet I-286-S for oil selection is available from Technical Publications, Troy, MI.

3. Oil recommendations noted in the data sheet are based on our experience in industry as a hydraulic component manufacturer.

4. Where special considerations indicated a need to depart from the recommended oils or operating conditions, see your Vickers representative.

E. CLEANLINESS

Thorough precautions should always be observed to insure the hydraulic system is clean:

1. Clean (flush) entire new system to remove paint, metal chips, welding shot, etc.
 2. Filter each change of oil to prevent introduction of contaminants into the system.
 3. Provide continuous oil filtration to remove sludge and products of wear and corrosion generated during the life of the system.
 4. Provide continuous protection of system from entry of airborne contamination, by sealing the system and/or by proper filtration of the air.
 5. During usage, proper oil filling and servicing of filters, breathers, reservoirs, etc., cannot be over emphasized.
 6. Thorough precautions should be taken, by proper system and reservoir design, to insure that aeration of the oil will be kept to a minimum.
- F. SOUND LEVEL

Section V - SERVICE INSPECTION AND MAINTENANCE

A. SERVICE TOOLS

1. One each of the following hollow set screw hex keys: metric, 2.5 mm, 3mm, and 4 mm - inch, 3/16, 5/16, 1/4, 1/2, and 5/8.
2. Torque wrench with adapters for above straight hex keys.
3. Internal Truarc pliers (2300).
4. Small adjustable (6") wrench.
5. Feeler gage set (inch or metric).
6. Arbor press.

B. SPECIAL TOOLS

No special tools are required for the maintenance of the valve.

C. INSPECTION

Periodic inspection of the fluid conditions and the tube or piping connections can save time-consuming breakdowns and unnecessary parts replacement. The following should be checked regularly:

1. All hydraulic connections must be kept tight. A loose connection in a pressure line will permit the fluid to leak out. If the fluid level becomes so low as to uncover the inlet pipe opening in the reservoir, extensive damage to the pump can result. In suction or return lines, loose connections permit air to be drawn into the system resulting in noisy and/or erratic operation.
2. Clean fluid is the best insurance for long service life. Therefore, the reservoir should be checked periodically for dirt or other contaminants. If the fluid becomes contaminated, the system should be drained and the reservoir cleaned before new fluid is added.
3. Filter elements also should be checked and

Noise is only indirectly affected by the fluid selection, but the condition of the fluid is of paramount importance in obtaining optimum reduction of system sound levels.

Some of the major factors affecting the fluid conditions that cause the loudest noises in a hydraulic system are:

1. Very high viscosities at start-up temperatures can cause pump noises due to cavitation.
2. Running with a moderately high viscosity fluid will impede the release of entrained air. The fluid will not be completely purged of such air in the time it remains in the reservoir before recycling through the system.
3. Aerated fluid can be caused by ingestion of air through the pipe joints of inlet lines, cylinder rod packings, or by fluid discharging above the fluid level in the reservoir. Air in the fluid causes a noise similar to cavitation.

replaced periodically. A clogged filter element results in a higher pressure drop. This can force particles through the filter which would ordinarily be trapped, or can cause the by-pass to open, resulting in a partial or complete loss of filtration.

4. Air bubbles in the reservoir can ruin circuit components. If bubbles are seen, locate the source of the air and seal the leak. (See table 3).

D. ADDING FLUID TO THE SYSTEM

When hydraulic fluid is added to replenish the system, it should always be poured through a fine wire screen (200 mesh or finer) or preferably pumped through a 10 micron (absolute) filter.

It is important that the fluid be clean and free of any substance which could cause improper operation. Therefore, the use of cloth to strain the fluid should be avoided to prevent lint getting into the system.

E. ADJUSTMENTS

No periodic adjustments are required.

F. LUBRICATION

Internal lubrication is provided by the fluid in the system.

G. REPLACEMENT PARTS

Reliable operation throughout the specified operating range is assured only if genuine Vickers parts are used. Sophisticated design processes and material are used in the manufacture of our parts. Substitutions may result in early failure. Part numbers are shown in the parts drawings listed in Table 2.

H. TROUBLE-SHOOTING

Table 3, lists the common difficulties experienced with relief valves. It also indicates probable causes and remedies for each of the troubles listed.

TROUBLE SHOOTING CHART

TROUBLE	PROBABLE CAUSE	REMEDY
No load pressure or low pressure.	Manual relief improperly adjusted.	Adjust manual relief valve to proper setting.
	Open vent connection.	Plug vent opening.
	Poppet not properly seated.	Back off adjusting screw several turns while running pump to clear any contamination between poppet and seat. Check poppet and seat for wear. Check spring.
	Self cleaning filter is plugged. (located in the pressure port).	Remove, clean and/or replace.
	Control orifice in body is plugged.	Remove filter screen and open orifice with a small wire. (orifice size is 0.040)
	No current to coil.	Check for loose electrical connection. Check output of power supply. Check resistance of coil. (resistance is 17 to 20 Ohms nominal).
	Piston sticking in the open position	Remove piston. Check piston and bore for burrs. Use polishing paper or an Arkansas stone to remove burrs.
Maximum pressure (valve will not modulate).	Plugged flapper orifice.	Clean orifice and clean and/or replace internal filters.
	Secondary filter plugged.	Clean filter.
	Button reversed causing blocking valve to prevent flow to nozzle.	Remove and reverse button.
	Power supply current maximum.	Vary command control of power supply. If current does not change, repair or replace the power supply.
Erratic pressure.	Contamination	Clean the system components, and flush the system.
	Piston sticking in body bore.	Remove piston. Check piston for burrs and freedom of movement in bore. Replace if necessary.
	Erratic input signal from power supply.	Check for loose electrical connections, broken wires, etc.
	Misalignment of cover and body causing piston to stick.	Loosen cover screws and check piston movement as described in reassembly section. Properly torque the cover screws.
Excessive noise or chatter.	High flow through valve.	Check valve flow rating. Replace with larger size valve if necessary.
	Excessive tank line pressure.	Connect tank line directly to reservoir.
	Vent line too long.	Add a restriction (needle valve or orifice), in the vent line next to the valve.
	Manual relief valve setting to close to system pressure.	Set manual relief higher than the maximum pressure setting of the electrically modulated valve.
	Dampening shim left out of the valve. (1000 PSI models only.)	Add shim to valve.
	Dither control located on power supply set to high.	Adjust dither control until a vibration is felt in the machine. Reduce the control setting until vibration just disappears.
	Power supply malfunction.	Check for loose connections, loose ground connection, broken wires, etc. Repair and/or replace.

A. GENERAL

WARNING

Turn off all electrical power and relieve hydraulic pressure. Before breaking a circuit connection, make certain that power is off and system pressure has been released. Lower all vertical cylinders, discharge accumulators, and block any load whose movement could generate pressure.

B. UNIT REMOVAL

1. Remove the unit from the system.
2. Cap all system openings to prevent contamination.

CAUTION

Absolute cleanliness is essential when working on a hydraulic system. Always work in a clean area. The presence of dirt and foreign materials in the system can result in serious damage or inadequate operation.

C. DISASSEMBLY

Periodic maintenance of the valve will generally not require disassembly to the extent described here. However, the sequence can also be used as a guide for partial disassembly. In general, disassembly is accomplished in the item number sequence shown in figure 3. Special procedures are included in the following steps:

NOTE

Discard and replace all "O" rings and gaskets removed during disassembly.

1. Thoroughly clean the exterior of the valve.
2. The valve cover is full of fluid, so hold it over a container when cover (4), figure 3 is removed.

NOTE

Refer to index numbers located on figure 3 throughout the disassembly procedure.

3. Remove parts (1) through (11a) except do not remove adjustment screw (7) from flapper plate S/A (8) unless inspection of nozzle (12) mating surface shows erosion. See figure 3.

4. Remove nozzle (12) with a 5 mm open end or a small adjustable wrench. Turn nozzle counter-clockwise to remove.

NOTE

Do not remove screw (18) or gasket S/A (17) in the following step unless gasket is damaged.

5. Remove parts (13) through (20). Pull coil (19) carefully from body (38), do not break wires. Part

(13) does not exist on 3000 PSI models.

6. Remove parts (21) through (30). If spool (27) is tight, thread a 5/16-18, (M8-6H), screw into the spool end, work the spool in and out to loosen, then remove spool from body (38).

CAUTION

Do not clean filter screen (28) with a scribe or a pick.

7. Remove parts (31) through (36). If the check valve seat is tight within the body, a small hooked tool may be used to remove the check valve seat. Press the ball inward and hook the seat; work the seat out by pulling first one side then the other.

8. Remove parts (37) through (52). Do not remove seat (53) unless inspection of piston (50) reveals damage to the piston seating surface.

NOTE

Plunger (46) contains an 8-32 thread for disassembly purposes, (early designs use a 10-24 thread).

9. Remove parts (54) through (66). Use the internal Truarc pliers to remove retaining ring (62).

10. Remove parts (67) and (68). These parts exist on -S6 special models only.

NOTE

Do not remove rollpin (69) in the following step unless damaged. The mounting surface can be scored during removal. If removal is necessary, check surface for burrs and flatness before installation of a new rollpin.

11. Remove parts (69) through (71). Do not remove seat (70) unless piston (59) shows evidence of damage in the seat area.

NOTE

CGE-10-*-20 units use a sleeve (70a) located below seat (70). Refer to figure 3. Replace the seat and sleeve if damaged.

D. CLEANING

All parts must be thoroughly cleaned and kept clean during inspection and assembly. The close tolerance of the valve makes this requirement more stringent than usual. Clean all removed parts, using commercial solvent that is compatible with the system fluid. Compressed air may be used in cleaning the valve, but it must be filtered to remove water and contamination. Clean compressed air is particularly useful in cleaning the spool orifices and body passages.

CAUTION

Do not stone edges of piston (59). See figure 3.

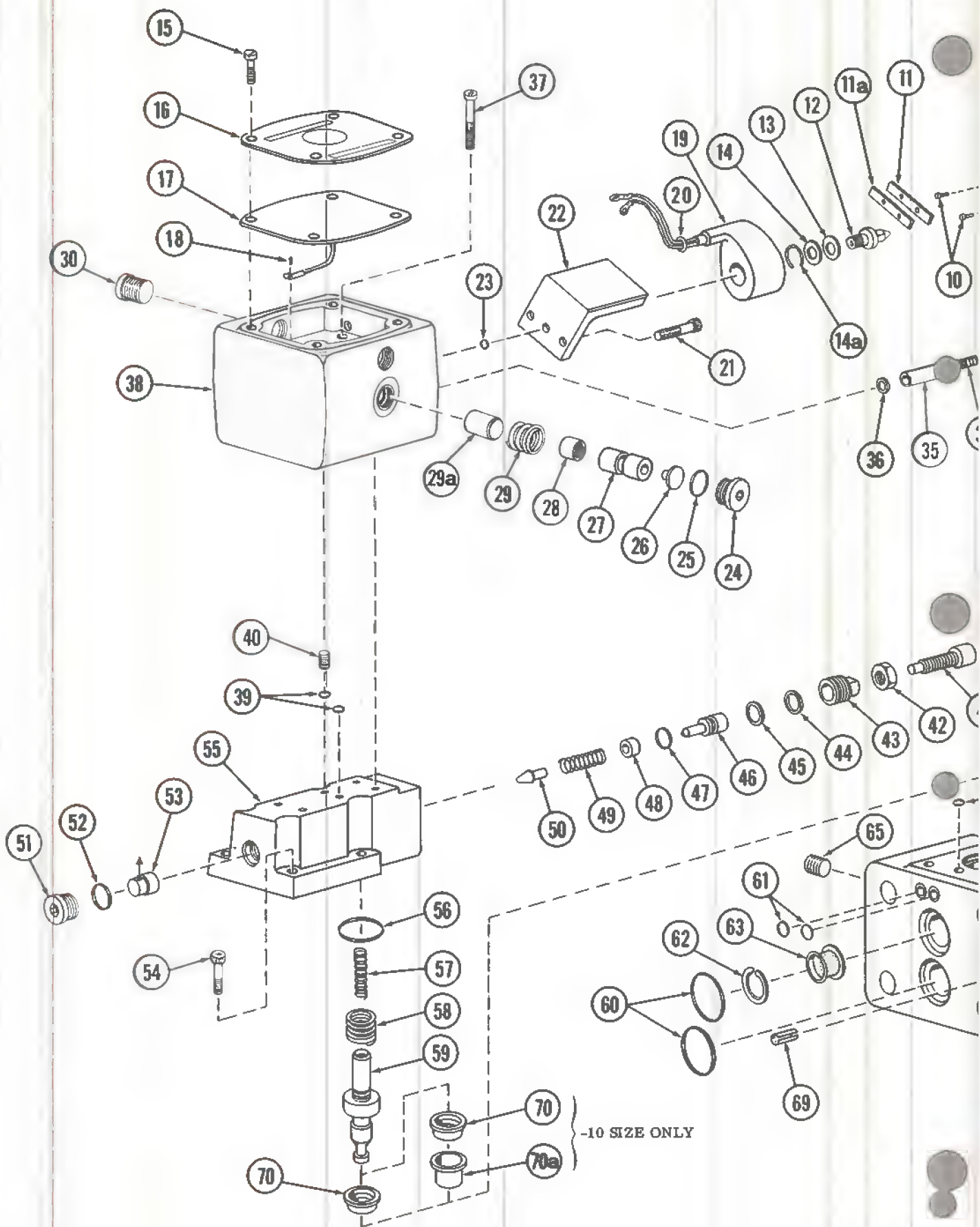
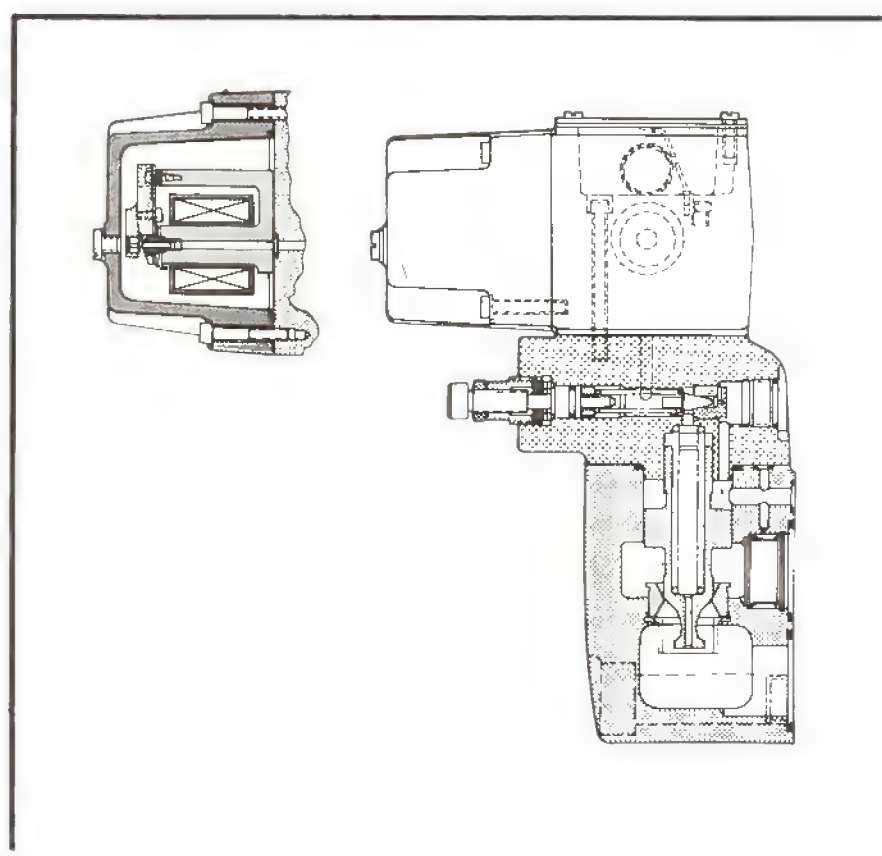
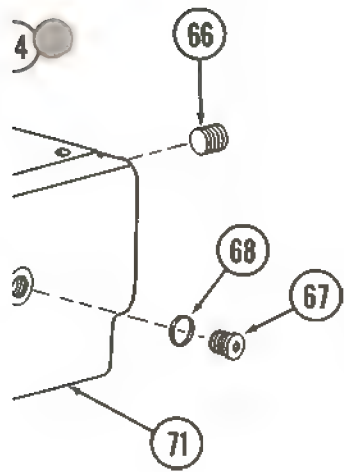
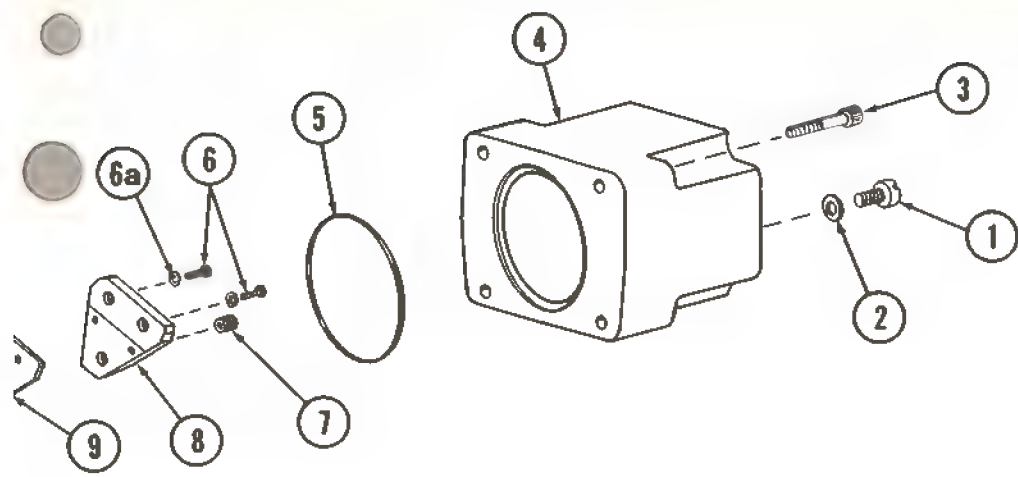


Figure 3. E



oded View

FIG. & INDEX NO.	DESCRIPTION	UNITS PER ASSY.
1	SCREW	1
2	WASHER (DYNA SEAL)	1
3	SCREW	4
4	COVER	1
5	"O" RING	1
6	SCREW	2
6a	WASHER	2
7	ADJUSTMENT SCREW	1
8	FLAPPER PLATE S/A	1
9	LEAF SPRING	1
10	SCREW	2
11	SHIMS	A/R
11a	SHIM	1
12	NOZZLE	1
13	DAMPENING SHIM	1
14	COIL RETAINER	1
14a	RETAINING RING	1
15	SCREW	4
16	NAMEPLATE	1
17	WIRE & GASKET S/A	1
18	SCREW	1
19	ENCAPSULATED COIL	1
20	"O" RING	1
21	SCREW	2
22	FRAME	1
23	"O" RING	1
24	PLUG	1
25	"O" RING	1
26	BUTTON	1
27	SPOOL (BLOCKING VALVE)	1
28	FILTER SCREEN	1
29	SPRING	1
29a	ROD	1
30	PLUG	1
31	SEAT	1
32	"O" RING	1
33	BALL	1
34	SPRING	1

FIG. & INDEX NO.	DESCRIPTION	UNITS PER ASSY.
35	RETAINER	1
36	WASHER	1
37	SCREW	4
38	BODY	1
39	"O" RING	2
40	PLUG	1
41	ADJUSTING SCREW	1
42	NUT	1
43	LOCK SCREW	1
44	SHIM	A/R
45	WASHER	1
46	PLUNGER	1
47	"O" RING	1
48	SPACER	1
49	SPRING	1
50	PISTON	1
51	PLUG	1
52	"O" RING	1
53	SEAT	1
54	SCREW	4
55	INTERMEDIATE BODY	1
56	"O" RING	1
57	SPRING	1
58	SPRING	1
59	PISTON	1
60	"O" RING	2
61	"O" RING	2
62	RETAINING RING	1
63	FILTER SCREEN	1
64	"O" RING	1
65	PLUG	1
66	PLUG	1
67	PLUG	1
68	"O" RING	1
69	ROLL PIN	1
70	SEAT	1
70a	SLEEVE	1
71	BODY	1

E. INSPECTION, REPAIR, AND REPLACEMENT

Check that all internal passages are clean and unobstructed. Examine all mating surfaces for nicks and burrs. Minor nicks and burrs. Minor nicks and burrs can be removed with an India stone, or crocus cloth. If unit has operated in a contaminated system, all internal passages of pilot body (38), intermediate body (55) and main stage body (71) must be thoroughly flushed with clean solvent.

NOTE

Refer to index numbers located on figure 3 throughout the inspection, repair and replacement procedure.

1. Inspect all screws for evidence of damaged threads. If threads are damaged, replace the screws.
2. Inspect springs (29, 34, 49, 57 and 58) for damaged coils. Replace springs if coils are damaged. Inspect springs for distortion. The ends of the springs shall be square and parallel to each other. Replace spring if distorted.
3. Perform a continuity test on coil (19). Resistance values should range from 17 to 19 Ohms. This test is superficial, a more rigorous test requires special equipment. Replace the part if threads are damaged. Inspect the orifice face of nozzle for evidence of nicks or scratches. If the orifice size is distorted, or face is eroded, replace the part.
4. Inspect nozzle (12) for damaged threads. Replace the part if threads are damaged. Inspect the orifice face of nozzle for evidence of nicks or scratches. If the orifice size is distorted, or face is eroded. Replace the part.

NOTE

Two nozzle sizes are available:

1. 0.070 inch diameter hole for 1000 PSI models.
 2. 0.058 inch diameter hole for 3000 PSI models.
5. Inspect mating surfaces of cover (4), frame (22), body (38), intermediate body (55), and body (71) for nicks and scratches. Remove nicks and scratches using an India stone and/or polishing paper.

NOTE

Use polishing paper on a clean flat surface.

6. If a new piston (59) is required, use a three (3) or four (4) cornered India stone to break the feather edge of balancing grooves. Use 500 grit polishing paper lightly on the outside diameter of the piston. Wash the piston in clean solvent.
7. If seat (70) was removed, make sure hole in body is clear.
8. Inspect spool (27), button (26), and filter screen (28). If spool is scratched across the lands, body (38) may have scratches within the bore. Check to ascertain damage and replace parts if scratches are such that binding of the spool occurs or leakage through the blocking valve is excessive. Minor scratches can be removed with 500 grit paper. Make certain filter screen is not ruptured or bent.

NOTE

If spool (27) shows indications of large particle contamination, replace filter screen (63).

9. Inspect adjustment screw (7) for erosion. If adjustment screw (7) is loose within flapper plate, replace screw. Inspect threads; screws (10) should thread easily into the flapper plate.
10. Inspect leaf spring (9) for burrs and possible fracture. Leaf spring should be flat. If a small bow exists, install the leaf spring against flapper plate (8) with bow outward. Screws (10) will pull the leaf spring flat against the flapper plate S/A. If bow is too great to be corrected, replace leaf spring (9).
11. Inspect the check valve assembly for burrs, and possible fracture.
12. Inspect piston (59) to body (71) clearance as follows: Clean and lubricate piston and body. Insert piston into body bore and turn 360° while moving the piston in and out of the bore. If binding occurs, remove piston, stone the balancing grooves and use 500 grit paper lightly on the surface of the piston. Clean and lubricate piston (59) and perform the clearance test again. Piston (59) should fit the bore with no noticeable side play. Check the piston's fit into intermediate body (55). Use the same procedure.
13. Make sure the 0.040 control orifice located in body (71) is open. The orifice is located below "O" ring (64) and is a straight through drilled hole.

F. ASSEMBLY

Replace the "O" rings removed from the unit with those supplied in the seal kit. Lubricated "O" rings and parts, using clean system fluid to facilitate assembly. Assembly of the parts will be in the reverse numerical sequence. Special procedures are included in the following steps:

NOTE

Refer to index numbers located on figure 3 throughout the assembly procedure.

1. If seat (70), (70 and 70a on -10 size units), was removed from body (71), install a new seat by pressing fully into place against the shoulder. Use an arbor press for this operation.
2. If seat (53) was removed, install new seat (53) full in against the shoulder. Orient radial hole toward pilot stage see figure 3. Use an arbor press to install seat (53).
3. If rollpin (69) was removed, make sure the mounting surface is flat before installation of a new rollpin.
4. Install plugs (67, 66, and 65) into body (71). Plug (67) exists on the -S6 models only. Use new "O" ring (68) on plug (67).
5. Install "O" ring (64), filter screen (63) and retaining ring (62) into body (71).
6. Install parts (59) through (54). Torque screws (54) hand tight, then use a hex key to move piston (59) within the valve (see figure 4). Piston (59) should not stick or show evidence of bind. Cross torque screws (54) to 112 lbf. in., (12.6 N.m) maximum. Check the piston again to see if a bind occurs.

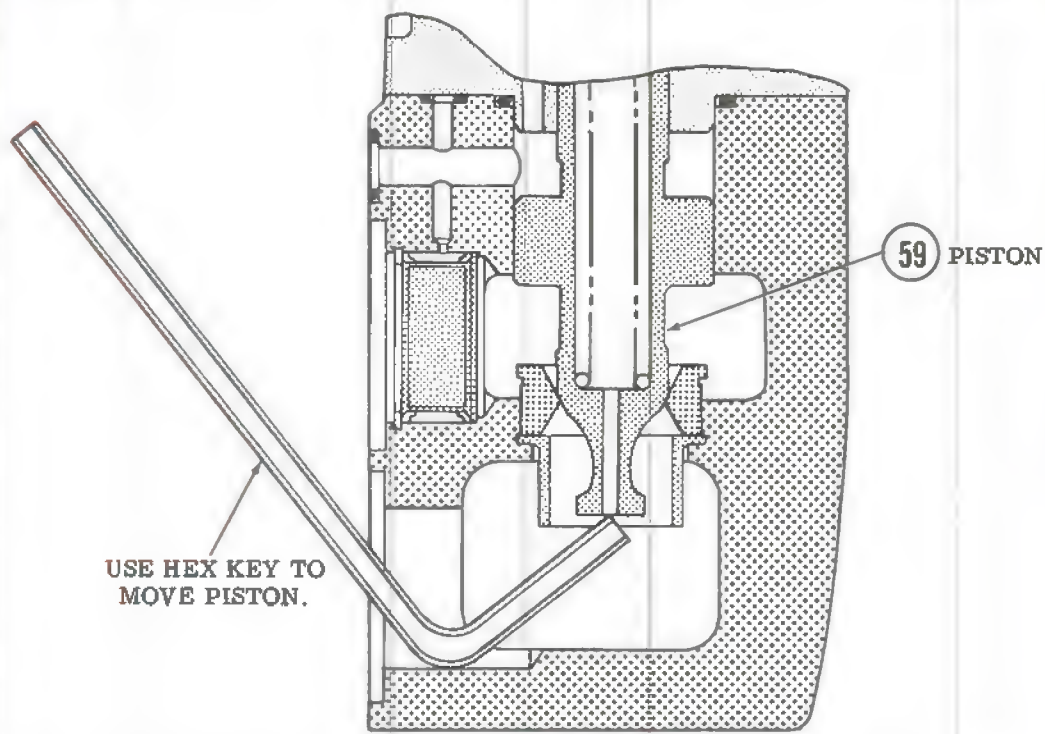


Figure 4. Check of main piston for bind.

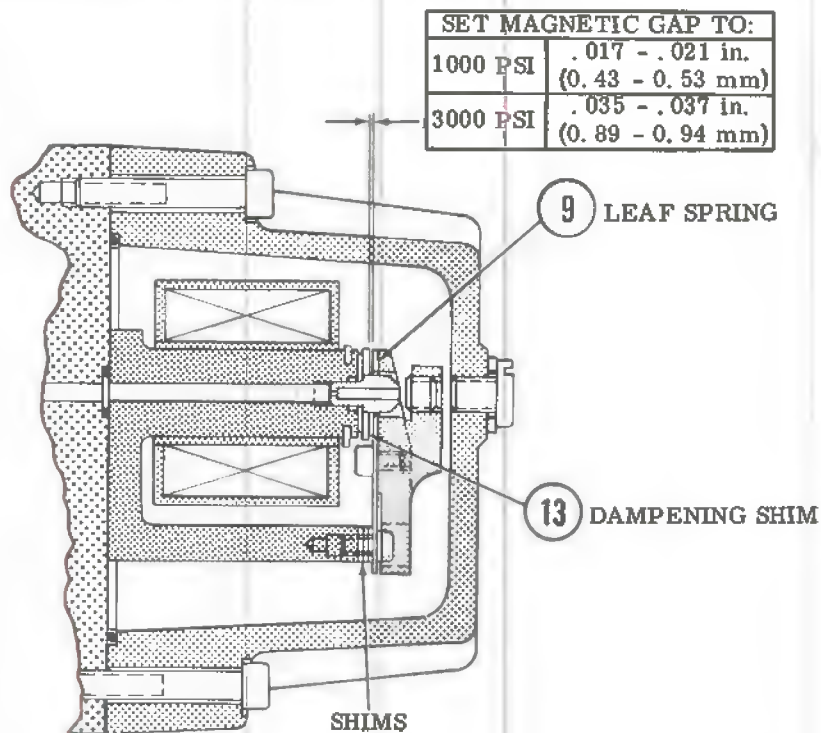


Figure 5. Setting magnetic gap on 1000 & 3000 PSI models.

Litho in U. S. A.

20-12-89

Overhaul Manual

VICKERS

A TRIMBOVA COMPANY

**Balanced Piston
Relief Valves**

**CG/CS/CS5-03/06/10 Series
CT/CT5/CG5-06/10 Series**



Vickers, Incorporated

P.O. Box 302
Troy, Michigan 48007-0302

REVISED 1-1-85

I-3300-S

SECTION	TABLE OF CONTENTS	PAGE
I	INTRODUCTION	1
	A. Purpose of Manual	1
	B. Related Publications	1
	C. Model Code	2
II	DESCRIPTION	2
	A. General	2
	B. Basic Parts	2
III	PRINCIPLES OF OPERATION	3
	A. Pressure Relief	3
	B. Venting	3
	C. Remote Control	3
IV	INSTALLATION	4
	A. Installation Drawings	4
	B. Circuit Connections	4
	C. Piping and Tubing	4
	D. Fluids and Seals	4
V	INSPECTION AND MAINTENANCE	4
	A. Inspection	4
	B. Cleanliness	4
	C. Adding Fluid to the System	4
	D. Hydraulic Fluid Recommendations	4
	E. Overload Protection	5
	F. Product Life	5
	G. Troubleshooting Chart	5
VI	OVERHAUL	5
	A. Unit Removal	5
	B. Service Tools	5
	Standard Tools	5
	Special Tools	6
	C. Disassembly	6
	D. Disassembly (C*5 Models)	6
	E. Inspection, Repair and Replacement	6
	F. Assembly	8
VII	START-UP AND TEST	8
	A. Start-Up	8
	B. Test	8

Section III - PRINCIPLES OF OPERATION

A. PRESSURE RELIEF

Figure 1 illustrates the basic valve operation. The valve pressure setting is determined by the adjusting screw position which varies the heavy spring compression. The balanced piston is normally held against the seat by the light spring. System pressure is present in chamber A and is connected to chamber B through orifice C.

The closed position of the valve is shown in Figure 1A. With system pressure less than the valve setting, the pilot poppet is held against its seat by spring force. Pressures in chambers A and B equalize through orifice C. Thus, the piston is hydraulically in balance and held against its seat by the light spring.

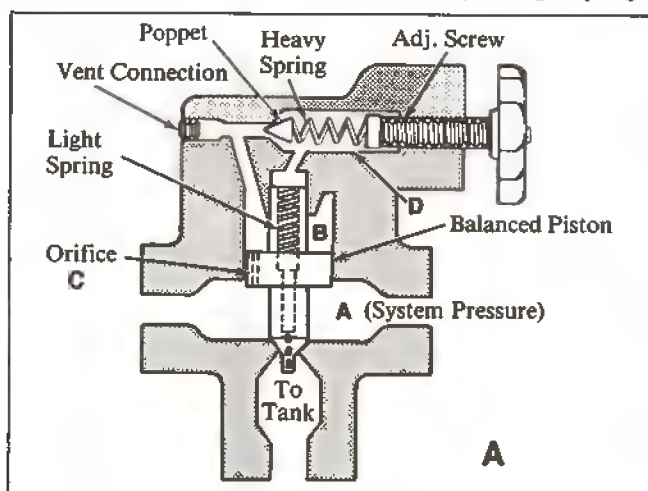


Figure 1A.

In Figure 1B the valve is shown throttling fluid to the tank port. This occurs when system pressure exceeds the heavy spring setting and forces the poppet away from its seat.

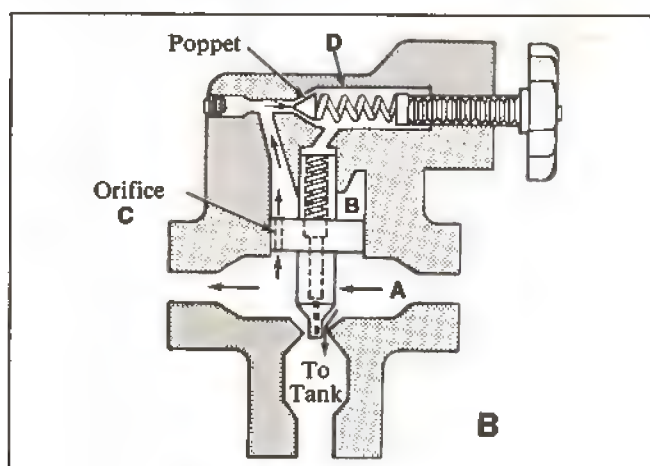


Figure 1B.

Fluid then flows through orifice C and chamber B, past the poppet into chamber D, and down through the drain hole in the center of the piston to the tank port.

The pressure in chamber B is limited by the setting of the heavy spring. When pressure in chamber A exceeds chamber B sufficiently, pressure unbalance overcomes the force of the light spring and lifts the piston. Excess fluid then flows past the bottom of the piston to tank.

When system pressure drops below the valve setting, the poppet reseats. Control flow through orifice C stops and pressures in chambers A and B are again effectively equalized.

The light spring then forces the piston toward the seat while orifice C continues to equalize pressure between chambers A and B. When the balance piston is closed against its seat, all flow through orifice C stops.

B. VENTING

The "High-Vent" option ("V" in the model code) is used when it is necessary to maintain pilot pressure for other valves in the system. This option provides a faster valve de-venting (closing) action. Higher pressure (approximately 80 PSIG) is maintained when the valve is vented because a heavier piston spring is used.

Relief valves can be vented to unload pump delivery to tank in the following manner:

Connect a shut-off valve to the vent port of the main relief valve. Chamber 'B' above the balanced piston can be opened to tank (see Figure 1B). This removes pressure at the top of the balanced piston. Pressure in chamber 'A' overcomes the light spring, unseats the balanced piston, and diverts all pump delivery to tank.

A solenoid controlled directional valve (C*5) may be used to vent flow to tank. This directional valve is mounted on top of a standard relief valve to form a single package. See Figure 6.

C. REMOTE CONTROL

The main relief valve may be adjusted from a remote location by using another adjustable valve similar in function to the main relief valve pilot stage (see Figure 2). Flow past the poppet of the remote control valve is directed to tank. The following rules should be maintained for optimum results:

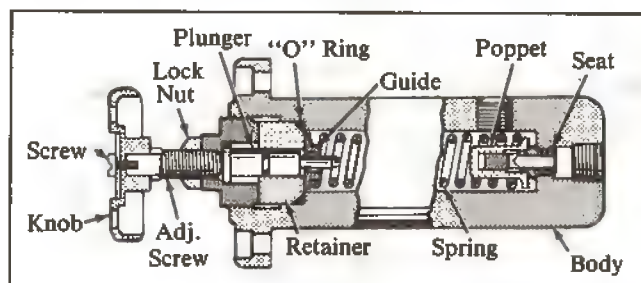


Figure 2.

1. Keep hydraulic lines (tubing) as short as possible.
2. Set main relief valve 200-300 PSIG above maximum operating pressure. DO NOT exceed the valve pressure rating.
3. Set remote control valve to maximum operating pressure.
4. Check system for stability characteristics. If the system is unstable, reduce the line length and/or proceed to step 5.
5. Install an orifice in the vent opening of the main relief valve cover and in the pressure port of the remote control valve. DO NOT go below 0.040 inch diameter or a malfunction could result. Orifices should be as large as possible to prevent excessive pressure drop and still maintain noise free operation.

Section IV - INSTALLATION

A. INSTALLATION DRAWINGS

The installation drawings listed in Table 2 show installation dimensions, port locations and operating parameters. Manifold, subplate and bolt kit information is also included.

NOTE

The tank line must be piped directly to tank to minimize back pressure. The drain line from the remotely operated valve (vent valve) must also be directly piped to tank. Any pressure in the drain line is additive to the pressure setting of the valve.

B. CIRCUIT CONNECTION.

Threaded type CT/CS valves are usually connected directly in the pressure line. Circuit flow passes through the ports located on opposite sides of the valve body. The bottom port (opposite the cover) is the return flow port and is connected to tank. These valves may be teed into the pressure line by plugging or blocking one of the pressure outlet ports.

CG type gasket mounted valves are teed into pressure lines. The tee is connected to the pressure port of the valve sub-plate or manifold. The return port is connected to tank. The valve must be mounted against a flat, ported, mounting surface.

Repair or replacement of CG valves is simplified in that piping need not be disturbed.

C. PIPING AND TUBING

1. All pipes and tubing must be thoroughly cleaned before installation. Recommended cleaning methods are sandblasting, wire brushing and pickling. Refer to instruction sheet 1221-S for pickling instructions.

2. To minimize flow resistance and the possibility of external leakage, use only the necessary fittings and connections required for proper installation.

3. The number of bends in tubing should be kept to a minimum to prevent excessive turbulence and friction of fluid flow. Tubing must not be bent too sharply. The recommended radius for tube bends is three times the inside diameter.

D. FLUIDS AND SEALS

Standard seals (Nitrile) can be used with petroleum, water glycols, and water-oil emulsion type fluids.

F3 seals (Viton*) can be used with all commonly used industrial hydraulic fluids. Viton* is compatible with petroleum, water-base and synthetic fire-resistant fluids.

*Trademark of Dupont De Nemours Co., Inc.

Section V - INSPECTION & MAINTENANCE

A. INSPECTION

Periodic inspection of the fluid condition and tube or piping connections can save time consuming breakdowns and unnecessary parts replacement. The following should be checked regularly.

1. All hydraulic connections must be kept tight. A loose connection in a pressure line will permit the fluid to leak out. If the fluid level becomes so low as to uncover the inlet pipe opening in the reservoir, extensive damage to the system can result. Loose connections also permit air to be drawn into the system resulting in noisy and/or erratic operation.

2. Air bubbles in the reservoir can ruin the valve and other components. If bubbles are seen, locate the source of air and seal the leak.

B. CLEANLINESS

Clean fluid is the best insurance for long service life. Therefore, check the reservoir periodically for dirt and other contaminants. If the fluid becomes contaminated, flush the entire system and add new fluid.

To insure your hydraulic system is clean, perform the following steps:

1. Clean (flush) the entire system to remove paint, metal chips, welding shot, etc.

2. Filter each oil change to prevent introduction of contaminants.

3. Provide continuous oil filtration to remove sludge,

products of wear and corrosion generated during the life of the system.

4. Provide protection to all areas that can introduce airborne contaminants into the system.

5. Perform regular servicing procedures of filters, breathers, and reservoirs.

C. ADDING FLUID TO THE SYSTEM

When hydraulic fluid is added to replenish the system, pour it through a fine wire screen (200 mesh or finer). DO NOT use a cloth to strain the fluid because lint may enter the system. When applicable, pump the fluid through a 10 micron filter or use a PFTU (porta filter and transfer unit). For PFTU information, order bulletin 366.

D. HYDRAULIC FLUID RECOMMENDATIONS

Hydraulic fluid within the system performs the dual function of lubrication and transmission of power. To insure proper lubrication, system life, and component reliability, fluid selection should be made carefully with the assistance of a reputable supplier. Fluid selection should be acceptable for use with all valves, motors and pumps within the system. Data sheets for fluid selection are available from Vickers, Inc., 1401 Crooks Road, Troy MI 48064, Attn. Technical Publications. For Industrial applications, order data sheet I-286-S.

The fluid recommendations noted in the data sheet are based on our experience in industry as a hydraulic component supplier. Where special considerations indicate a need to depart from these recommendations, see your Vickers sales representative.

Section I - INTRODUCTION

A. PURPOSE OF MANUAL

This manual describes operational characteristics, maintenance requirements, and overhaul information for Vickers balance piston relief valves. Information contained herein pertains to the latest design models that are listed in Table 1.

MODEL
CT/CS-10-**-30
CT/CS/CG-H10-**-30
CT/CS/CG-06-**-50
CT/CS/CG-H06-**-50
CS-03-**-50
CS5-03-***-***-90
CT5/CG5-06/*10-***-***-90

Table 1

B. RELATED PUBLICATIONS

Service parts and installation dimensions are not contained in this manual. The parts and installation drawings listed in Table 2 are available from any Vickers sales engineering office or from:

Vickers, Incorporated
Technical Publications
1401 Crooks Road
Troy, Michigan 48084

MODEL DESCRIPTION	PARTS & SERVICE DRAWING	INSTALLATION DRAWING
CG-06-**-20	I-3302-S	510900
CG-06-**-40	I-3306-S	510900
CG-06-**-50	I-3368-S	510900
CG-H06-*V-50	I-3366-S	510900
CG-H10-*V-30	I-3399-S	510900
CG-10-**-20	I-3301-S	510900
CG-10-**-30	I-3697-S	510900
CS-03-**-20	I-3301-S	510500
CS-03-**-40	I-3305-S	510500
CS-03-**-50	I-3369-S	510500
CS-06-**-20	I-3304-S	510500
CS-H06-*V-50	I-3367-S	510500
CS-H10-*V-30	I-3699-S	510500
CS-10-**-20	I-3304-S	510500
CS-10-**-30	I-3698-S	510500
CT-06-**-20	I-3301-S	510500
CT-06-**-40	I-3305-S	510500
CT-06-**-50	I-3369-S	510500
CT-H06-*V-50	I-3367-S	510500
CT-H10-*V-30	I-3699-S	510500
CT-10-**-20	I-3301-S	510500
CT-10-**-30	I-3698-S	510500
CS5-*03-***-***-70 *-*--70	I-3364-S	511005
CS5-*03-***-***-80 *-*--80	I-3679-S	511005
CS5-*03-***-***-81 *-*--81	I-3691-S	511005
CS5-*03-***-***-90 *-*--90		511006
CG5/CS5/CT5-06-***-***-70	I-3364-S	511005
CG5/CS5/CT5-06-***-***-80	I-3679-S	511005
CG5/CS5/CT5-06-***-***-81	I-3691-S	511005
CG5/CS5/CT5-10-***-***-70	I-3365-S	511005
CG5/CS5/CT5-10-***-***-80/81	I-3680-S	511005
CG5/CS5/CT5-10-***-***-90		511006

Table 2. Related Publications

C. MODEL CODES

Variations within each model series are covered in the model code. See Table 3. Each unit has a model code stamped into the

nameplate. Service inquiries should always include the complete model number as noted on the nameplate.

MODEL CODE BREAKDOWN

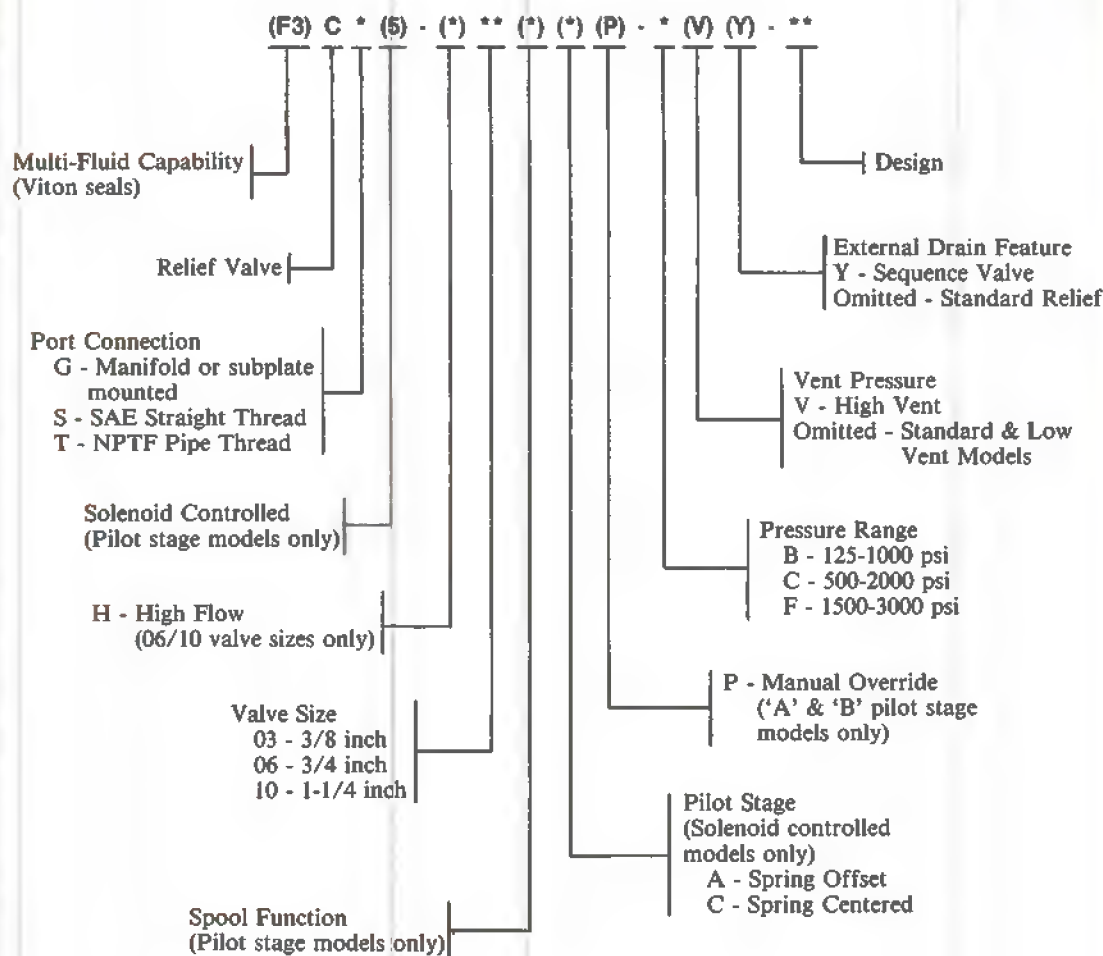


Table 3. Model Code

Section II - DESCRIPTION

A. GENERAL

Relief valves are devices used to limit maximum pressure in hydraulic systems. When system pressure starts to exceed the pressure setting of the relief valve, a controlled amount of hydraulic fluid bypasses through the tank port and limits the system pressure to the valve setting. A fine incremented adjustment assures precise regulation over wide pressure ranges.

A Vickers relief valve provides a fast response with very low pressure override characteristics because of its two-stage

balance piston design. The balance piston relief valve is so named because in normal operation it is in hydraulic balance. Further details are discussed in Section III.

B. BASIC PARTS

Relief valves consist of two sections: the cover section and the body section. The cover section includes a pressure adjustment screw, a heavy spring, a poppet, a seat, and a vent connection. The body section includes a piston, a light spring, a seat, and the port connections.

NOTE

Reliable operation throughout the specified operating range is assured only if genuine Vickers parts are used. Sophisticated design processes and materials are used in the manufacture of our parts. Substitutions may result in early failure.

NOTE

Replace all parts that do not meet the following specifications.

1. Inspect all screws (13) for evidence of damaged threads. If threads are damaged, replace the screws.

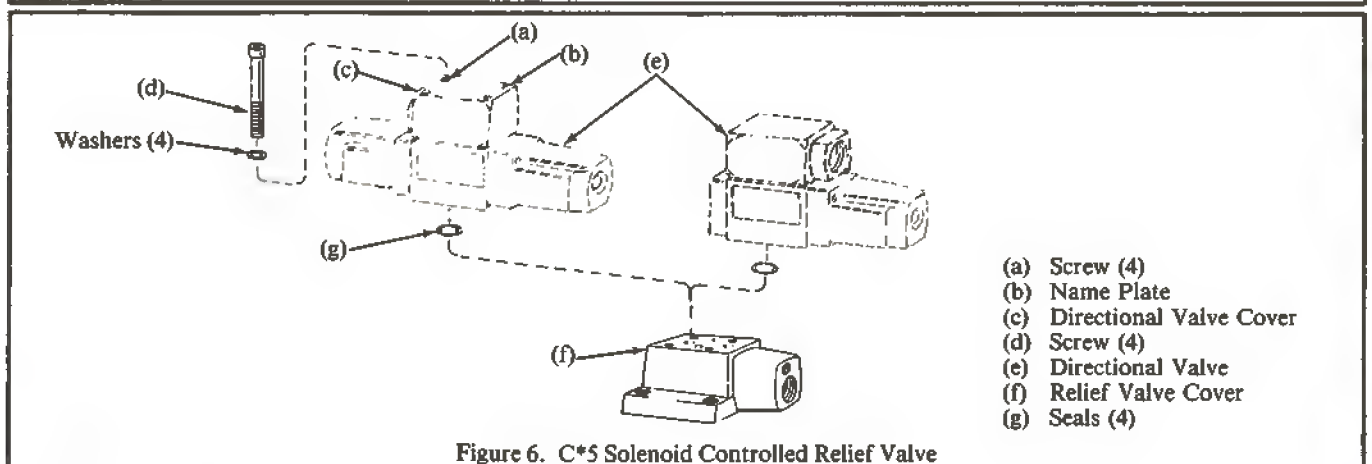
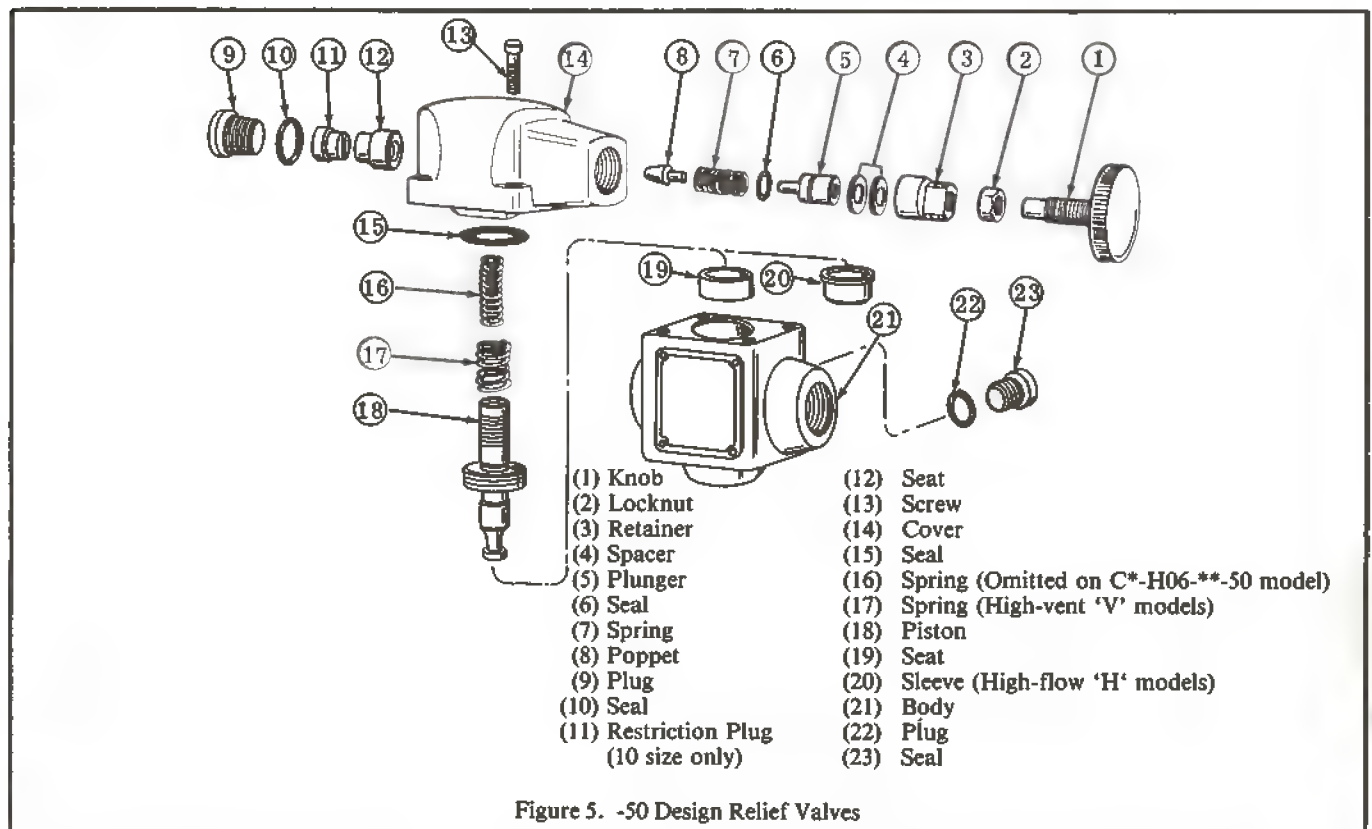
2. Inspect springs (7), (16), and (17) for distortion or damaged coils. Replace springs if coils are damaged.

3. Inspect the piston (18) to cover (14) clearance. Insert the piston into the cover and check for looseness. A close tolerance fit is mandatory for proper valve operation. If a loose fit is noted, the cover is worn and must be replaced.

4. Inspect the piston (18) to body (21) clearance. The piston should have a close tolerance fit as noted in step 3. If the piston is loose inside the body bore, replace the body and seat (19).

5. Inspect piston (18) for nicks or scratches across the sealing surface. Make sure the balance hole in the piston is free from foreign material. Remove minor scratches on piston with 500 grit polishing paper. If the piston has heavy scratches, replace the piston (18), seat (19), and body (21).

6. Inspect poppet (8) and seat (12) for heavy wear or evidence of washout. Replace both the poppet and seat if heavy wear or washout is noted.



7. If seat (19) was removed during disassembly, make sure inside of body (21) is clean and free from damage.

8. Inspect mounting surfaces on cover and body for burrs, nicks, or scratches. Remove burrs and/or scratches with India stone or polishing paper. Also check body and cover for damaged or worn threads. If threads are worn or damaged, replace the part.

F. ASSEMBLY

Assembly of parts will be in reverse numerical sequence as shown in Figure 5. Obtain new seals. Seal kits are noted on the parts and service drawings that are tabulated in Section I, B. Make sure all parts are clean prior to assembly. Lubricate all parts with a light film of clean hydraulic fluid.

1. Secure body (21) in a vise.

2. If sleeve (20) was removed during disassembly, insert the sleeve into bottom of body bore. NOTE: This step applies to C*-H**-30/50 models only.

3. If seat (19) was removed, install new seat into body (21) as follows:

a. Lubricate seat with petroleum jelly or grease that is compatible with system fluid.

b. Position the seat square over the body bore. Place a rod against the seat. Hold the rod centered. Tap on end of rod with hammer until seat is started into body, then drive the seat into the body bore until it bottoms out. Inspect the body and seat to be sure no chips or metal shavings were developed.

4. Install parts (18) through (15). NOTE: Spring (16) is used on high vent models only ('V' in the model code).

5. Slide piston (18) back and forth within the body bore. Also rotate the piston 360° to make sure piston movement is free and without bind.

6. Assemble cover (14) to body (21). Cross tighten four screws (13) evenly. Torque the screws to 14.9-20.3 Nm. (133-178 lb.in.).

7. Secure valve body in vise to a horizontal position. Place screwdriver or similar tool in tank port against bottom of piston (18). Push the piston up and down within the body. If the piston hangs up or binds, loosen screws (13) on cover (14) to a snug condition. Lightly tap around cover perimeter with a soft tip hammer until the piston moves freely within the body bore. Retighten the cover screws.

8. Install parts (11) through (9). NOTE: Restriction plug (11) exists in C*-10-** models only. Torque plug (9) to 22.6-27.1 Nm. (200-240 lb.in.).

9. Install parts (8) through (3). Be sure to install the same quantity of spacers (4) that were removed. The spacers determine the pressure adjustment range of the valve. Make sure seal (6) is assembled on plunger (5).

10. Install parts (2) and (1). Thread knob (1) in retainer (3) approximately five complete turns.

NOTE

The following step applies to C*5 solenoid operated relief valves only.

11. Assemble directional valve on cover in reverse alphabetical sequence as shown in Figure 6. Torque screws (d) to 5.6 Nm. maximum (50 lb.in.).

Section VII - START-UP AND TEST

A. START-UP

Start the system and sequence the unit through all positions while watching for appropriate movement of actuators. Improper or erratic movement of the actuators may indicate incorrect assembly of the unit or presence of trapped air.

B. TEST

A test stand having regulated flow, temperature control and special fixtures is required to fully test the performance of the rebuilt unit. Because of this, only the functional test shown in the start-up paragraph is given. If such a test stand is available, test the unit to the requirements set forth in the installation drawings.

E. OVERLOAD PROTECTION

A relief valve must be installed in the system as close to the pump as possible. The relief valve limits pressure in the system to a prescribed maximum. The setting of the relief valve depends on the work requirements of the system.

F. PRODUCT LIFE

The longevity of these products is dependent upon environ-

ment, duty cycle, operating parameters and system cleanliness. Since these parameters vary from application to application, the ultimate user must determine and establish the periodic maintenance required to maximize life and detect potential component failure.

G. TROUBLESHOOTING CHART

Table 4 lists the common difficulties experienced with pumps and hydraulic systems. It indicates probable causes and remedies for each of the troubles listed.

TROUBLE	PROBABLE CAUSE	REMEDY
ERRATIC PRESSURE	Foreign matter in system Worn poppet or seat in cover Piston sticking in body or cover	Drain, flush and refill system with clean fluid. Replace poppet and seat. Clean piston. Remove burrs by light lapping. Check freedom of movement on reassembly. Replace if necessary.
LOW PRESSURE OR NO PRESSURE	Valve improperly adjusted Vent connection open Balance hole in piston plugged Poppet in cover not seating	Adjust valve to proper setting. Plug vent connection. Remove piston and clean out. If necessary, drain system and refill with clean fluid. Back off adjusting screw several turns while running pump to be certain foreign matter is not caught on the seat. Check condition of seat, spring, and poppet if malfunction persists.
EXCESSIVE NOISE OR CHATTER	High oil velocity through valve Distorted control spring Worn poppet or seat in cover Excessive tank line pressure Vent line too long Valve setting too close to that of system operating pressure	Check valve flow rating. Replace with larger valve if necessary. Replace spring. Replace poppet and seat. Connect return port directly to tank. Place a restriction, eg. needle valve or orifice plug in vent line next to relief valve. Set relief valve at least 150 PSI higher than other valves in circuit.

Table 4. Troubleshooting Chart

Section VI - OVERHAUL

A. UNIT REMOVAL

WARNING

Turn off all electrical power and relieve any hydraulic pressure. Block any load that could generate pressure.

1. Remove relief valve from system.
2. Drain appropriate hydraulic lines and remove the valve from system.
3. Cap all system openings to prevent contamination.
4. Place the relief valve on a clean work bench.

B. SERVICE TOOLS

The following tools are recommended to overhaul a CG, CS, CT, or C*5 relief valve.

STANDARD TOOLS AND EQUIPMENT:

1. A 6 inch crescent wrench.
2. One set of hex key wrenches with a socket adaptor.
3. Petroleum jelly or grease that is compatible with hydraulic fluids.
4. Cleaning solvent.
5. A small ball peen hammer.
6. One medium size screwdriver.
7. One torque wrench (0-250 lb.in.)
8. A clean work bench that is equipped with a vise.
9. Shop air (90 psi).

SPECIAL TOOLS

Depending on the extent of repair, the following special tools are recommended.

1. A piece of drill rod or roll steel to remove the seat within the valve body. See Figure 3.

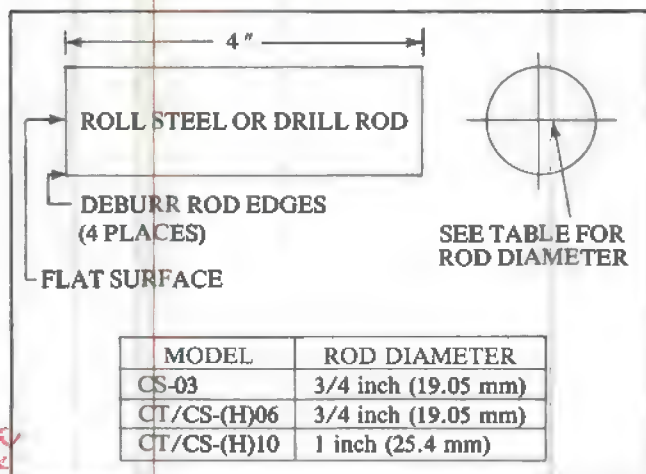


Figure 3. Disassembly Tool to Remove Seat (19) from Body (21)

2. One screw (approximately 4 inches long), two washers, and one nut. This particular tool is needed to remove the seat and/or sleeve from the body of CG (subplate mounted) models only. See Figure 4.

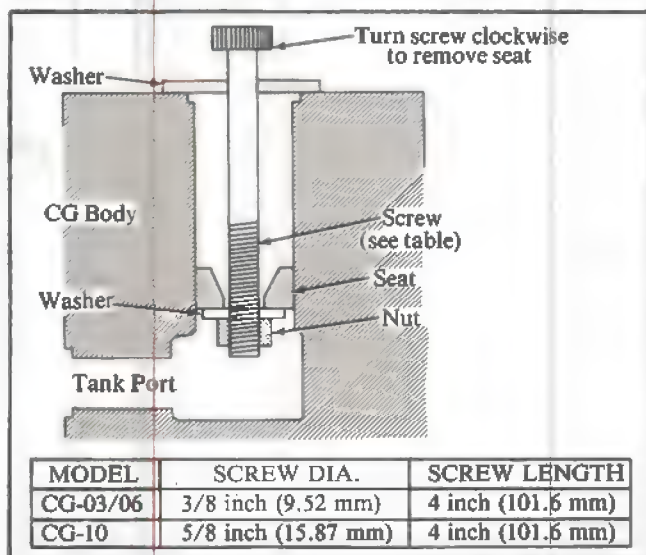


Figure 4. Seat (19) Removal Tool (CG Models)

C. DISASSEMBLY

Periodic maintenance of the relief valve will generally not require disassembly to the extent described here. However, the following disassembly sequence can be used as a guide for partial disassembly. In general, disassembly is accomplished by item number sequence shown in Figure 5.

1. Thoroughly clean the valve exterior with cleaning solvent.
2. Secure valve body (21) in a vise.
3. Loosen lock nut (2).
4. Turn knob (1) counterclockwise and remove knob from valve cover (14). (Note: An adjusting screw replaces the knob on C*5 models.)
5. Remove parts (3) through (8). Inspect poppet (8) for damage to sealing surface. If poppet (8) is damaged, replace

with a new cover subassembly.

6. Inspect seat (12) for nicks, scratches, and washout. If the seat shows evidence of damage, replace with a new cover subassembly. DO NOT attempt to remove seat (12) from cover (14).

7. If seat (12) is in good condition, remove plug (9), seal (10), and spacer (11). (NOTE: Spacer (11) exists on C*-10-**-** models only.)

8. Remove four screws (13) from cover (14), then disassemble the cover from body (21).

9. Remove parts (15) through (18) from body (21). Inspect piston (18) sealing surface for heavy scratches and other damage. Discard seal (15).

10. If piston (18) is damaged, turn valve body (21) in vise so tank port faces up. Insert a rod (reference Figure 3) into the tank port against seat (19). Tap on rod end with hammer and remove the seat (19) from body (21). For C*-H**-30/50 models, insert rod against sleeve (20) and remove sleeve and seat at the same time.

NOTE

The following step refers to CG models only.

11. If piston (18) is damaged, secure body (21) in vise so mounting surface is face up. Insert a screw through seat (19). See Section VI, B and Figure 4 for removal of seat (19).

12. Remove plug (22) from body (21). Remove seal (23) from plug (22).

13. Discard seals (6), (10), (15) and (23).

D. DISASSEMBLY (C*5 MODELS)

Except for removal of the solenoid operated directional valve, the disassembly sequence of a C*5 valve is essentially the same as a standard relief valve.

1. Remove the four nameplate screws (a) and loosen nameplate (b) from directional valve cover (c).
2. Loosen four screws (d) and remove directional valve (e) from valve cover (f).
3. Discard seals (g).
4. Disassemble the relief valve per Section VI, C and follow Figure 5.

NOTE

This manual does not cover the repair and/or overhaul of solenoid operated directional valves. If the directional valve causes the relief valve to become inoperative, obtain the necessary parts and service information for directional valves.

E. INSPECTION, REPAIR AND REPLACEMENT

NOTE

All parts must be thoroughly cleaned and kept clean during inspection and assembly. The close tolerance of the parts makes this requirement very important.

1. Discard all old seals. Wash all parts in a clean mineral oil solvent and place them on a clean surface for inspection.

2. Carefully remove burrs by light stoning or lapping. Be certain there is no paint or burrs on mating surfaces of valve bodies.

3. Inspect the valve spools and bores for burrs and scoring. If scoring is not deep enough to cause objectionable leakage, the surfaces can be stoned or polished with crocus cloth. If scoring is excessive, the valve body and spool must be replaced by ordering a new section. Check the valve spool for freedom of movement in the bore.

4. Check the relief valve for smooth movement in its bore. The valve should move from its own weight.

D. ASSEMBLY

NOTE

Coat all parts with clean hydraulic oil to facilitate reassembly and provide initial lubrication. Petroleum jelly can be used to hold seal rings in place on assembly.

1. Valve Body (Figure 9) - On models with single-acting spool, install the "O" ring on the port plug and plug the appropriate cylinder port. Tighten the plug securely, but DO NOT over tighten.

2. Relief Valve - Install the "O" ring on the relief valve plug. Place the relief valve assembly in its bore, hex nut end towards opening. Install the spring and plug and tighten the plug securely but DO NOT over tighten.

3. Check Valve - Install a new back-up ring and "O" ring on the check valve plug with the "O" ring toward the spring and poppet. Place the poppet and spring in the body and install the plug.

4. Operating Spool - If centering spring and spool have been removed, install new "O" rings in the "O" ring groove in the body at each end of the spool bore. Install spool in bore from the cap end. Install the flat retainer, guide and screw. Tighten the screw securely. Align the flat retainer by shifting the spool. Spool bind is an indication of flat retainer misalignment. Install the end cap and attaching screws. Tighten the end cap screws securely. On models with detents grease all the detent parts and install the piston, spring and plug. Be sure to screw the plug in all the way.

5. Assembly of Unit Sections.

CAUTION

Make sure all mating surfaces of valve bodies are free of burrs and paint.

Install seal rings in the grooves in the body of each inlet and center section. Use petroleum jelly to hold the seals in place. For CM2 valves, install the spacers to insure against spool bind when the studs are tightened. With the mounting feet on a flat surface carefully place the sections together in the same order in which they were removed. The mounting feet must be maintained in a flat plane to prevent spool bind (due to body distortion) when the valve is mounted for operation. If levers are used, install pins in each spool and assembly the levers, fulcrum rod and "E" rings. Tighten the nuts on the CM2 to 45-50 foot pounds torque and on the CM3 to 55-60 foot pounds torque.

SECTION VII-VALVE OPTIONS

A. GENERAL - Operating sections can be supplied with anti-cavitation check valves, and combination anti-cavitation check valves with cylinder port relief valves. The use of these accessories will be identified by a special feature suffix on the model number. Refer to the installation drawings listed in Table 1 for these options.

1. Anti-Cavitation Check Valve - To eliminate cavitation created in the system, an anti-cavitation check valve may be employed. The valve can be installed on each cylinder port of any operating section where required. When the system pressure is less than tank pressure, a vacuum is created. The anti-cavitation check valve equalizes the unbalanced pressure condition by metering fluid from the tank passage back to the pressure port. The anti-cavitation check valve is located in valve operating sections next to the

cylinder ports and function when the spool is in neutral and operating position.

2. Anti-Cavitation Check With Cylinder Port Relief Valve - The anti-cavitation check with cylinder port relief valve is a combination of anti-cavitation check valve with an integral cylinder port relief valve sub-assembly. The operation of the anti-cavitation check feature is described in paragraph VII, A, 1. The cylinder port relief sub-assembly limits the maximum pressure in the cylinder port. The relief sub-assembly normally functions when the valve spool is in the neutral position. Fluid is discharged from the cylinder port to the tank passage of the directional valve. The pressure setting is generally higher than the main system relief valve. The relief valve sub-assemblies are pre-set at the factory.

SECTION VIII-TESTING

Vickers Mobile Division application engineering personnel should be consulted for recommendations on test stand circuit requirements and construction. If

test equipment is available, valves should be tested at the recommended flow and pressure shown on installation drawings M-259218 and M-259219.

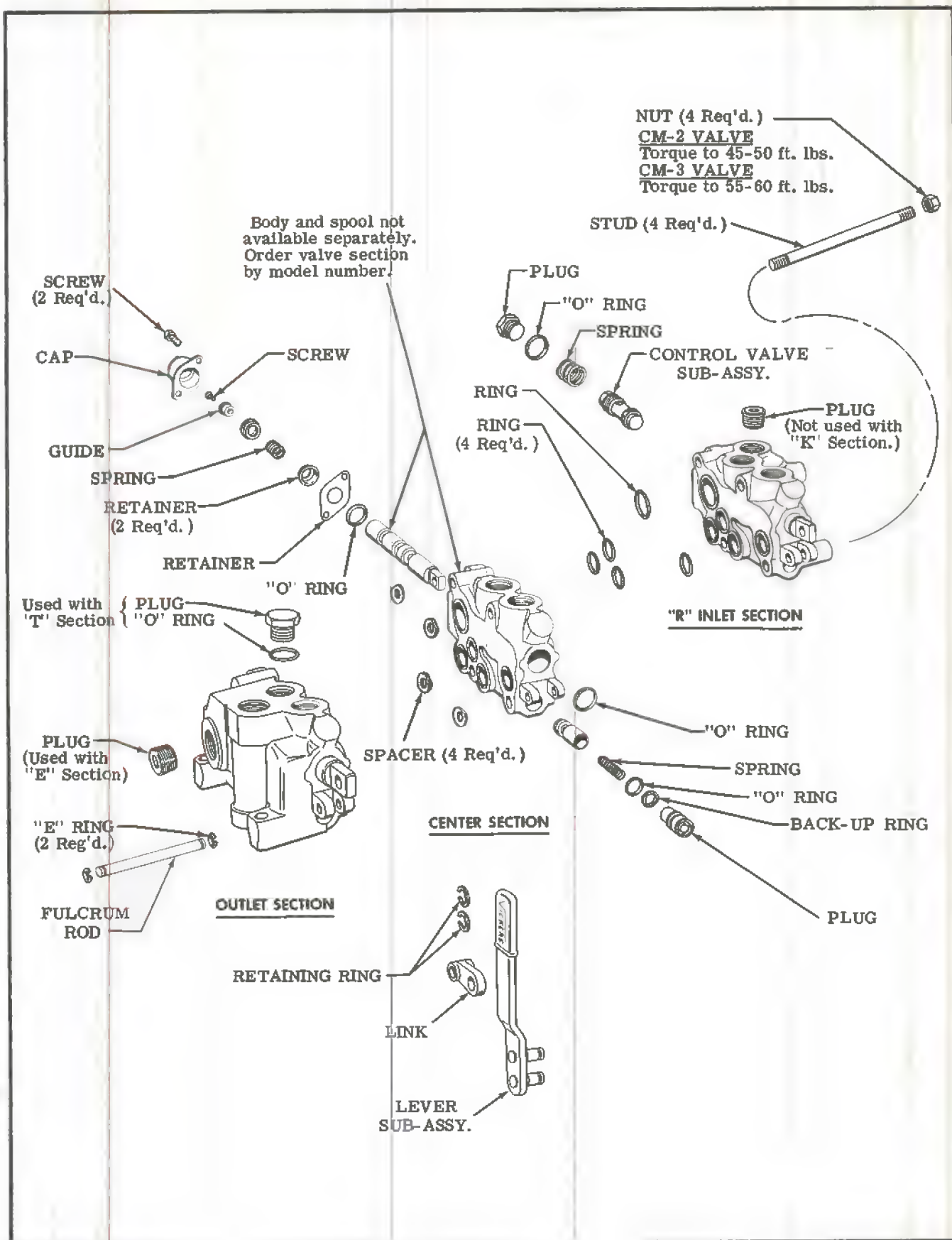
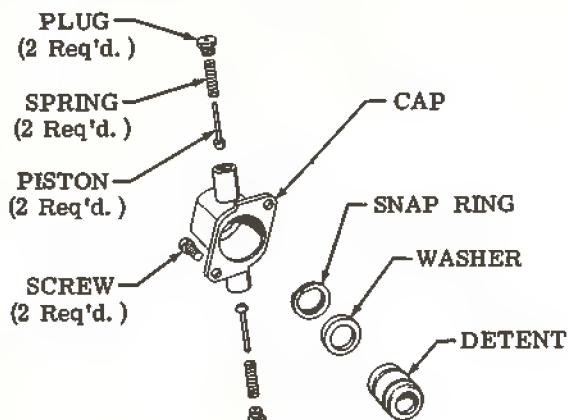
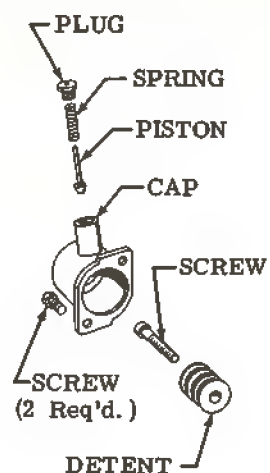


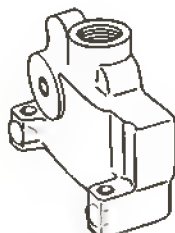
Figure 9



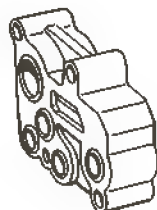
DETENT USED ON "C" FLOAT SECTION



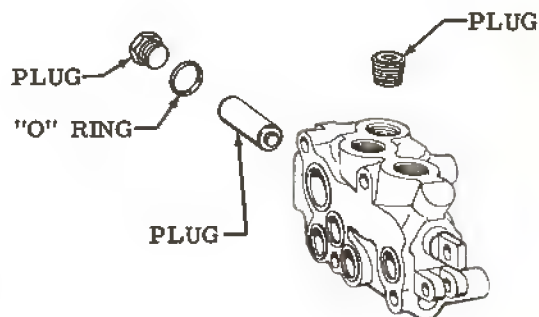
DETENT USED ON "I" SECTION



"L" SECTION

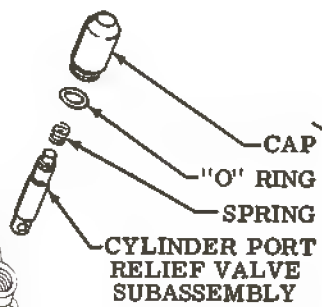
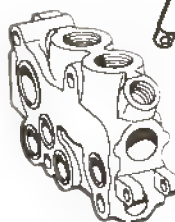
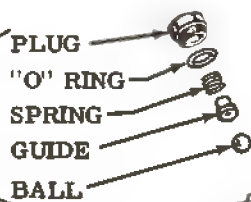


"U" SECTION



"F" INLET SECTION

ANTI-CAVITATION
CHECK VALVE
ASSEMBLY



ANTI-CAVITATION
CHECK WITH
CYLINDER PORT
RELIEF VALVE
ASSEMBLY

CHECK AND CYLINDER PORT RELIEF OPTIONS

Figure 9A

VICKERS®

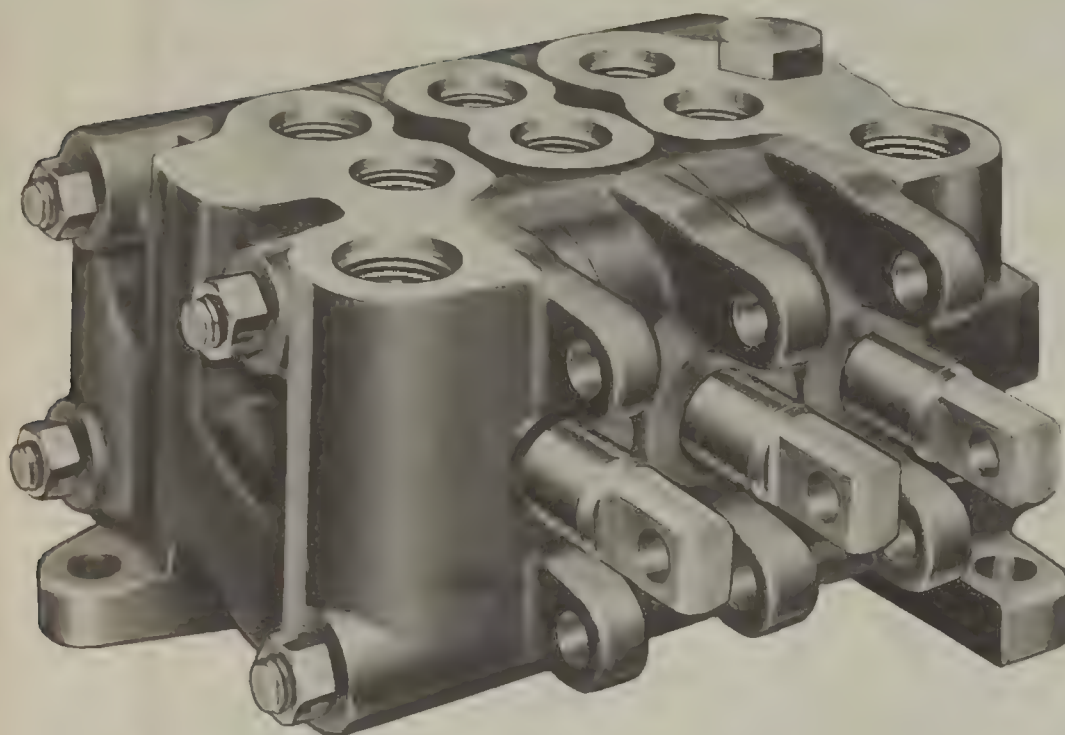
A TRINOVA COMPANY

Overhaul Manual

10

**Multiple
Unit
Valves**

CM11 Series -21 Design



Vickers, Incorporated

P.O. Box 302
Troy, Michigan 48007-0302

Revised 11-1-85

M-1780-S

TABLE OF CONTENTS

Section	Page
I INTRODUCTION	
A. Purpose of Manual	1
B. General Information	1
II DESCRIPTION	
A. General	2
B. Assembly and Construction	2
C. Optional Features	2
D. Mounting	2
E. Application	2
III PRINCIPLES OF OPERATION	
A. General	3
B. Operating Sections	3
C. Non-Operating Sections	8
IV INSTALLATION AND OPERATING INSTRUCTIONS	
A. Installation Drawings	8
B. Mounting	8
C. Port Connections	8
D. Relief Valve	8
E. Tandem Installation	8
F. Micro-Switch and Cam Installation	8
G. Hydraulic Tubing	8
H. Hydraulic Fluid Recommendations	9
V INSPECTION AND MAINTENANCE	
A. Service Tools	9
B. Inspection	9
C. Adding Fluid to the System	10
D. Lubrication	10
E. Replacement Parts	10
F. Troubleshooting	10
VI OVERHAUL	
A. General	10
B. Disassembly	10
C. Cleaning, Inspection and Repair	10
D. Assembly	11
VII TESTING OF MULTIPLE UNIT VALVES	11

SECTION I - INTRODUCTION

A. PURPOSE OF MANUAL

Service information in this manual covers the principles of operation, installation, maintenance and repair of Vickers CM11 Series, -21 design Multiple Unit Valves.

dimensions are on installation drawing 303. Copies are available on request from your local Vickers application engineering office or from: Vickers, Incorporated 1401 Crooks Road, Troy, Michigan 48408

B. GENERAL INFORMATION

Service parts information for these valves is contained in Parts Catalog M-1729-S. Oil recommendation information is shown on data sheet M-2950-S.

Table I is a complete breakdown of the model code covering these units. Service inquiries should always include the complete model numbers which are stamped on the valve bodies.

TABLE I - MODEL CODE BREAKDOWN

CM 11 ZS 1 -R 25 V*** * L - 21 ***									
MULTIPLE UNIT CONTROL VALVE			SERIES			SPECIAL FEATURE			
VALVE BANK MODIFICATION			DESIGN			OUTLET BODY TYPE			
NO - NO MODIFICATION			L - STANDARD			E - CARRYOVER PORT			
ND - STANDARD SECTIONS - DUST COVERS			E1 - E SECTION WITH ADDITIONAL OUTLET PORT			SPOOL MODIFICATION (OMIT IF NOT REQUIRED)			
NS - STANDARD SECTIONS - ELECTRIC SWITCH ACTUATORS			1 - DETENT FOR ANY SPOOL			2 - LIGHT CENTERING SPRING			
ZO - NARROW BYPASS SECTIONS NO MODIFICATIONS			7 - HALF LOAD CENTERING SPRING			SPOOL TYPE			
ZD - NARROW BYPASS SECTIONS DUST COVERS			A6 - COUNTERBALANCE			B - MOTOR			
ZS - NARROW BYPASS SECTIONS ELECTRIC SWITCH ACTUATORS			C - FLOAT			D - DOUBLE ACTING			
PORT CONNECTIONS			D3 - DUAL FUNCTION			D4 - SPECIAL METERING			
1 - 7/8-14 UNF - 2B INLET AND DISCHARGE PORTS - 3/4-16 UNF - 2B CYLINDER PORTS			D5 - COMBINED & B SPOOL FUNCTIONS			T - SINGLE ACTING			
2 - 11/16-12 UNF - 2B INLET & DISCHARGE PORTS - 7/8-14 UNF - 2B CYLINDER PORTS			W3 - SAFETY INTERLOCK			ADJUSTABLE SYSTEM			
INLET BODY TYPE			RELIEF VALVE SETTING - PSI (OMIT IF NOT REQUIRED)			V05 - 500 PSI			
F - CARRYOVER PORT - NO RELIEF VALVE			V12 - 1250 PSI			V20 - 2000 PSI			
R - STANDARD - RELIEF VALVE (PARTIAL FLOW BYPASS)			V07 - 750 PSI			V15 - 1500 PSI			
K - STANDARD - RELIEF VALVE (FULL FLOW BYPASS)			V10 - 1000 PSI			V17 - 1750 PSI			
J - STANDARD - RELIEF VALVE (PARTIAL FLOW BYPASS)			V22 - 2250 PSI			V25 - 2500 PSI			
SYSTEM RELIEF VALVE SETTING - PSI									
05 - 500 PSI			12 - 1250 PSI			20 - 2000 PSI			
07 - 750 PSI			15 - 1500 PSI			22 - 2250 PSI			
10 - 1000 PSI			17 - 1750 PSI			25 - 2500 PSI			

SECTION II - DESCRIPTION

A. GENERAL

The CM11 - 21 Series Valves are made up of directional control valve sections mounted in banks and connected internally to common pressure and tank return passages. A valve bank usually consists of an inlet and operating (R*, K* or F*), a number of operating sections (*) and an operating and outlet section (*L or *E). Each operating section contains a sliding spool (for example A, B, C, T, D or W spool). In valve banks where only one operating section is required, an R* section is used with an L or E tank plate section.

B. ASSEMBLY AND CONSTRUCTION

Figure 1 is a cross-sectional view showing the construction and assembly of a three-section valve. Each section contains a sliding spool with centering springs and a check valve. The inlet section also contains a relief valve assembly.

Passages between the bodies connect each section to the common inlet and tank ports. Seal rings

between the sections seal the connecting passages. Sections are held together by studs and nuts.

C. OPTIONAL FEATURES

1. Micro-switch attachment - CM11*S models are equipped with a switch mounting bracket and a cam extension on the spool to actuate a micro-switch when the spool is shifted (see Section IV, paragraph F).

2. Spool detents - A spool detent assembly consists of a special end cap with a spring loaded plunger and a spool extension. The plunger engages in grooves in the spool extension to hold the spool in the desired position.

D. MOUNTING

CM11 Series -21 design valves are mounted with lugs cast into the inlet and outlet sections.

E. APPLICATION

Vickers application engineering personnel should be consulted for valve ratings and applications.

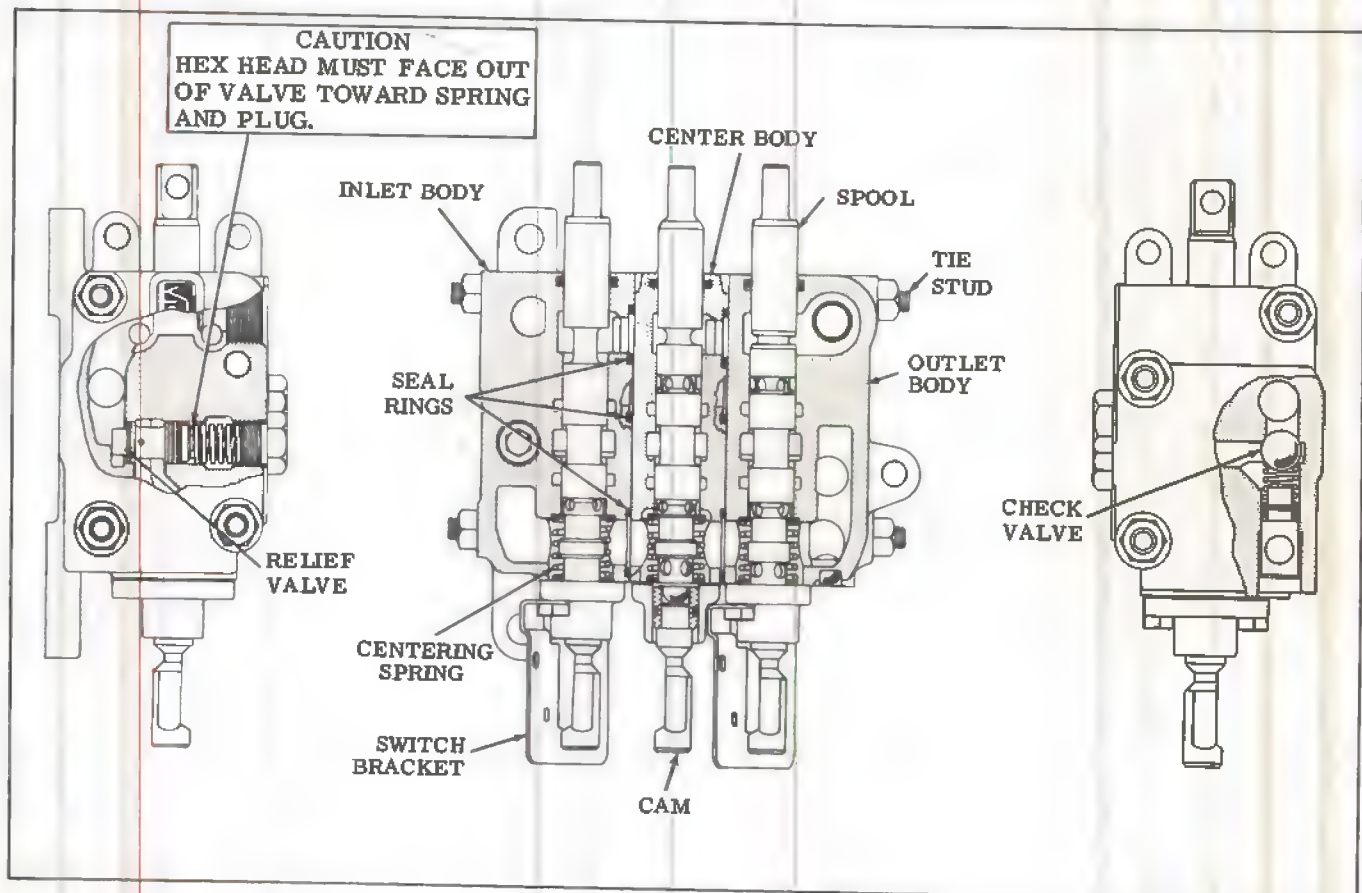


Figure 1

SECTION III - PRINCIPLES OF OPERATION

A. GENERAL

Figure 2 is a schematic illustration of a three section valve, showing the inlet and outlet ports and the by-pass, pressure and tank passages. The pressure passage is used to carry fluid to the cylinder ports when the spools are shifted. The by-pass passage permits flow directly to the outlet when the spools are not being operated. The tank passage also carries fluid to the outlet; either return flow from the cylinder ports or fluid diverted past the flow control and relief valve.

The spools are shown in the centered or neutral position. Under these conditions, fluid in the pressure passage is blocked from the cylinder ports by the spool lands. Flow through the valve is through the by-pass and tank passages to the outlet.

B. OPERATING SECTIONS

1. Inlet Sections - The CM11-21 Series valve bank may be obtained with operating, R*, F*, or K*, inlet sections. These sections are available with the spools listed in Table I.

These sections are individually described below.

(a) R* Section - The R* section is equipped with an integral relief valve for overload protection. It is built to accept a check valve to prevent return flow through the valve.

The integral relief valve, with an orifice plug, also acts as a partial flow control valve. This feature lowers the pressure drop between the inlet and outlet ports. (See paragraph 4 for relief valve and flow control operation.)

The relief valve cracking pressure is pre-set at the factory. The pre-set cracking pressures range up to 2500 psi maximum. (See Table I Model Code for pressure settings.)

(b) F* Section - The F* section has two pressure connections. One connection is made to the pump source and the second connection is made with a preceding valve assembly to accept the by-pass flow for tandem operation.

The F* section like the R* section is built to accept a check valve to prevent return flow when this feature is required. However, F* sections do not employ relief valve or partial flow by-pass.

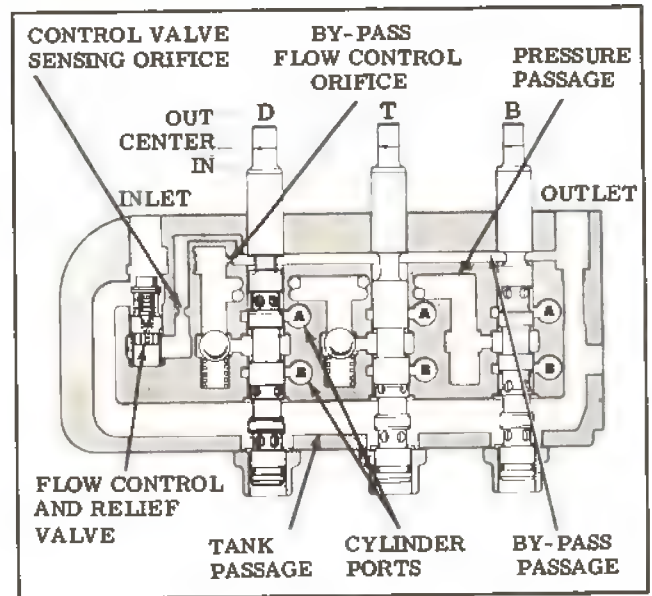


Figure 2

(c) K* Section - The K* section is essentially the same as the R* section except it has a full by-pass feature.

2. Outlet Sections

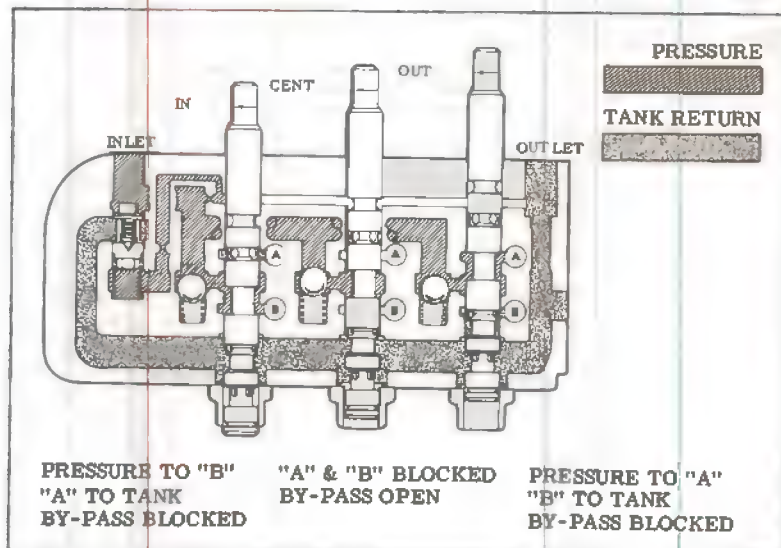
(a) *L Section - When two or more spools are required in a valve bank, the last section will be an *L section. The "*" denotes the spool type. This section contains the exhaust oil port and also is built to accept a check valve to prevent back flow when this feature is required.

(b) *E Section - This section is used for tandem operation by providing an outlet connection through which the by-pass feature for pump unloading is extended on to a subsequent valve bank. It is used in conjunction with an "F*" type inlet section in the next valve bank. Like the *L section it contains an operating spool and is built to accept a check valve to prevent back flow when this feature is required.

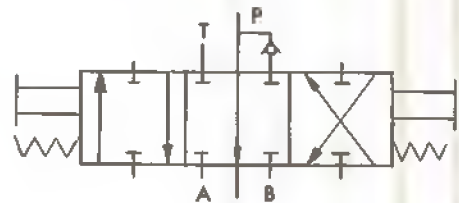
3. Spool Operation

Six standard spool designs are available (A, B, C, D, T and W). Any combination of spools may be used with a valve bank to perform a variety of operations. All operating spools are equipped with centering springs which return the spools to neutral.

For convenience, U. S. A. S. I. symbols are shown with the following descriptions of each spool.

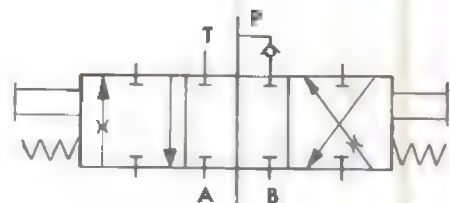
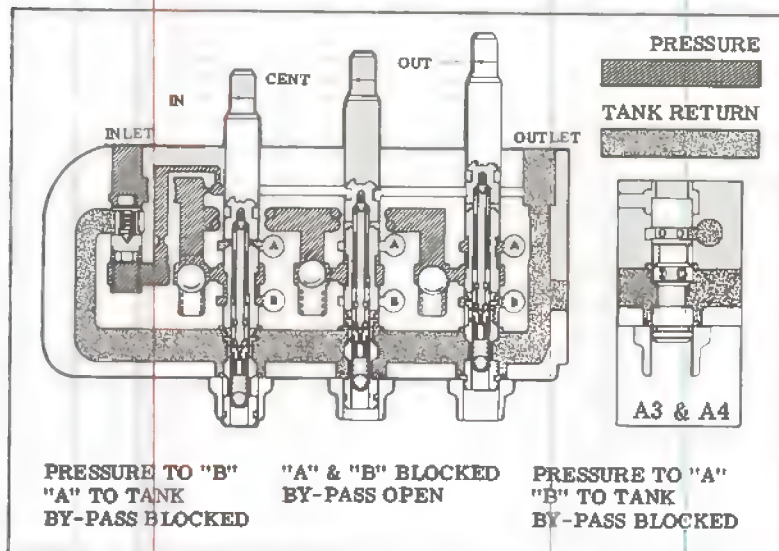


(a) "D" Double Acting Spool - "D" spools are used for applications where pump flow must be directed to either end of a cylinder, depending on the direction of movement required. The end of the cylinder not under pressure has its return flow directed to reservoir via internal coring of the valve sections. See Figure 3 for spool position versus flow.

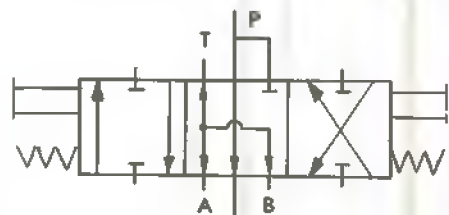
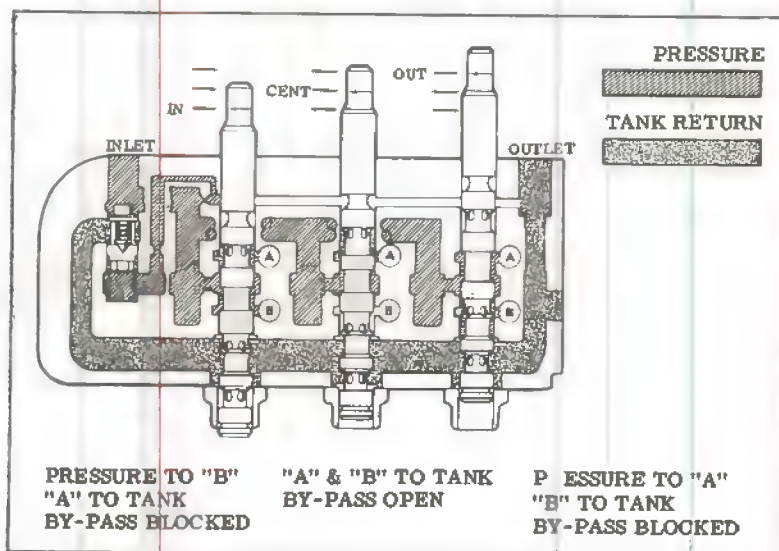


(b) "A" Double-Acting Spool - The "A" spool is a double-acting spool with variable orifices. An internal spool is used to provide this variable restriction. So long as there is a positive inlet pressure, the orifice is large, permitting unrestricted return flow. Decreased inlet pressure permits the spool to shift, decreasing the orifice size.

(c) "A3" and "A4" Spools - These are double-acting spools with fixed orifices to restrict flow to the reservoir from either cylinder port (see Figure 4). This prevents losing control of the load. Operation is otherwise the same as the "D" spool. See sub-paragraph (a) above.



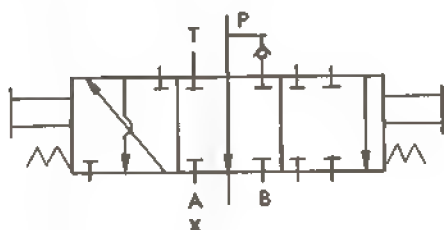
(d) "B"-Motor Spool - "B" spools are used when flow is directed to the operation of a hydraulic motor instead of a cylinder. These spools are double acting in character so that the motor may be rotated in either direction. The cylinder ports are left partially open in the neutral position to allow free flow of oil between the motor and reservoir. Check valves are not used in "B" spools. See Figure 5 for spool position vs. flow characteristics.



(e) **"C" Float Spool** - "C" spools are double acting with an additional float position. The spool is retained in the float position by a detent, and it is spring centered to neutral from the "in" and "out" positions. Both cylinder ports are open to the reservoir in the float position to permit free flow of oil in either direction. See Figure 6 for spool position versus flow.



(f) **"T" Single Acting Spool** - "T" spools direct flow to one end of an operating cylinder only as in the example of the lift mechanism on a fork-type truck. Return flow is from the same end of operating cylinder and relies on gravity or mechanical means. Flow is controlled to and from port B. Port A is plugged. See Figure 7 for spool position versus flow.



(g) **"W" Single Acting Spool** - The "W" spool is a single-acting spool which operates the reverse of the "T" spool explained above. Flow is controlled to and from port A, and port B is plugged.

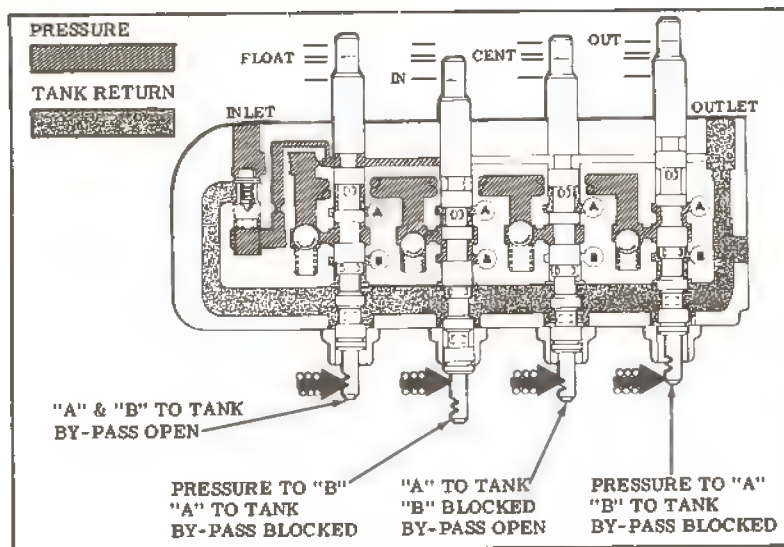
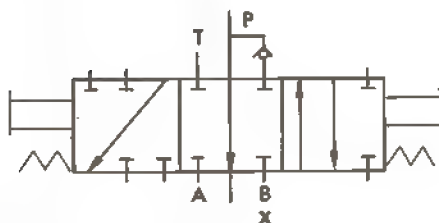


Figure 6 "C" FLOAT SPOOL

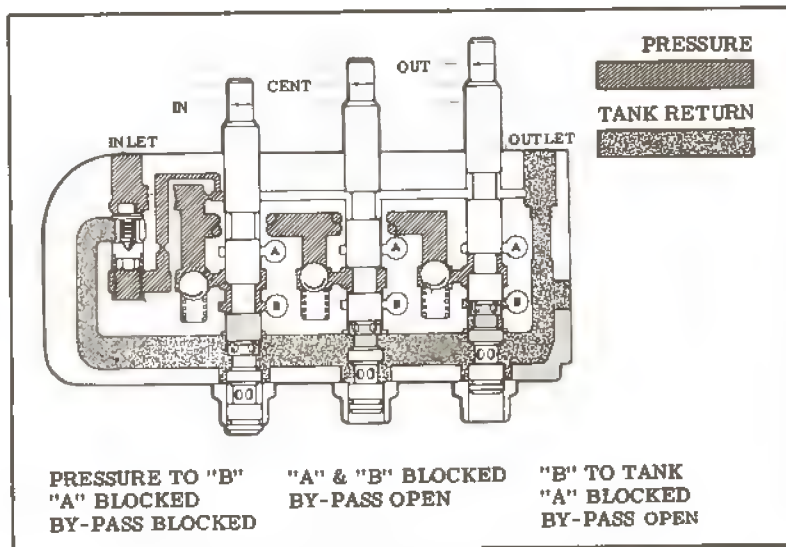


Figure 7 "T" SINGLE ACTING SPOOL

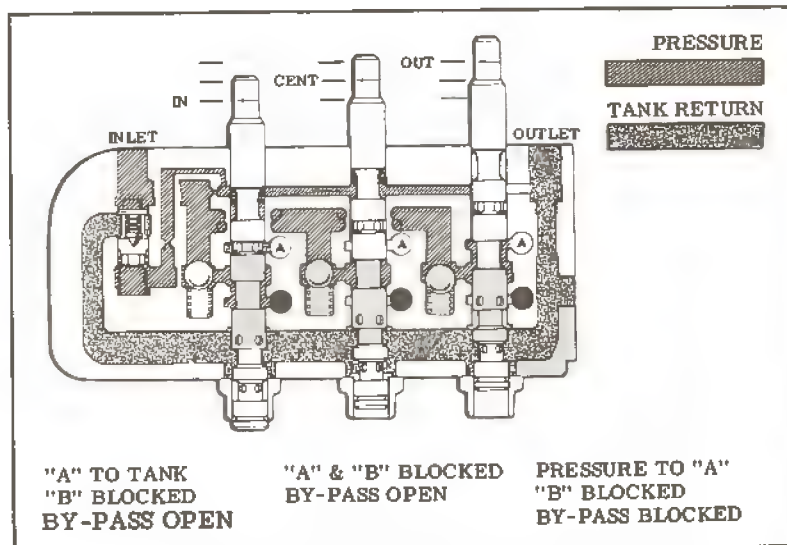


Figure 8 "W" SINGLE ACTING SPOOL

4. Flow Control and Relief Valve

Earlier design valves were equipped with simple relief valves in the inlet sections. The partial flow by-pass system in the CM11-21 valve makes use of a compound type flow control and relief valve arrangement.

By sensing the pressure drop across an orifice at the entrance to the by-pass, the valve acts as a flow control to limit flow through the by-pass to approximately seven gallons per minute. The balance of the pump delivery is diverted through the reservoir passage. This arrangement greatly reduces pressure drop through the valve in the neutral position.

When a spool is shifted to operate a portion of a machine, the flow control is inoperative and full pump volume is available to the system. The control valve then functions as an overload relief valve. System pressure is limited to a prescribed maximum by the action of this valve. Inlet body type "F" (Table I), is not equipped with a relief valve. Full pump volume is available to the system at all times.

(a) **Flow Control** - Figure 2 shows the valve operation in neutral with flow in excess of seven gpm. Flow across the by-pass orifice results in a pressure drop. The decreased pressure is sensed at the spring end of the valve sub-assembly through a sensing orifice. The slightly higher pressure at the other end of the valve permits it to shift down, diverting excess flow to the reservoir passage. With flow less than seven gpm, there would be negligible pressure drop across the by-pass orifice. Then the control valve would be held closed by the large spring and all flow would be through the by-pass passage.

(b) **Relief Valve** - Operation of the relief valve feature is shown in Figure 9. When an operating spool is shifted, fluid is ported into the system and the by-pass is blocked.

Figure 9A shows operation at less than the relief valve setting. There is no flow over the by-pass orifice, so full system pressure is sensed at the spring end of the control valve, as well as the opposite end. The valve is thus hydraulically balanced and the large spring holds the relief valve spool closed.

Maximum pressure is determined by the setting of the small spring inside the control valve assembly. When system pressure is high enough to overcome this heavy spring, the poppet is forced off its seat. (See Figure 9B.) Fluid immediately flows past the poppet to the tank passage. This flow creates a pressure drop across the sensing orifice and the control valve is no longer hydraulically balanced. When pressure drop across the sensing orifice is great enough to overcome force of the large spring, the valve spool shifts, permitting flow to the tank passage.

5. **Check Valves** - Timing of the valve spools is such that one cylinder port opens to pressure and the other port opens to reservoir before the by-pass passage is completely blocked. To prevent return

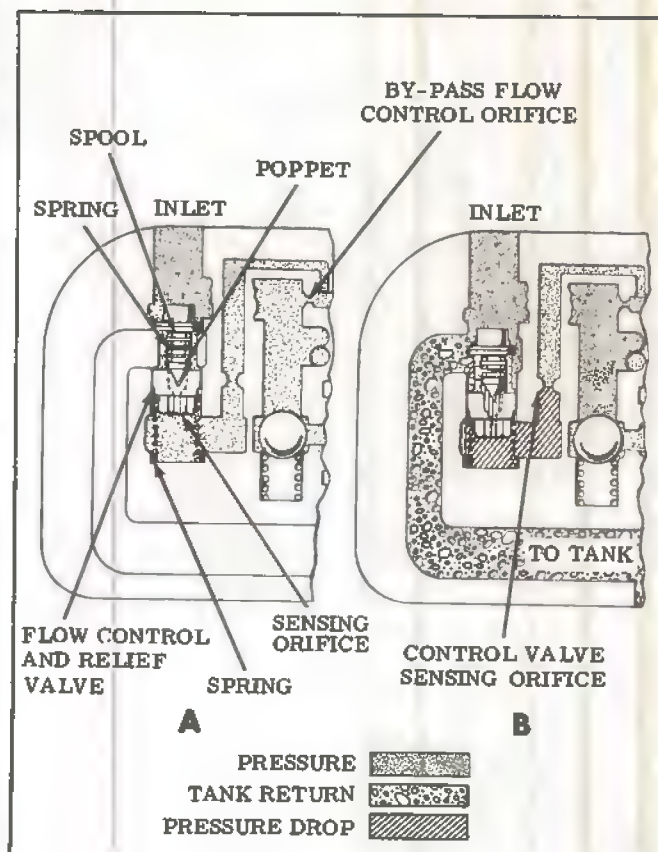


Figure 9

flow from a cylinder port from passing into the pressure passage and escaping through the partially closed by-pass, check valves are provided in each operating section except sections with "B" spool. The check valves prevent the load from dropping.

6. **Detent** - The spool detent consists of a special end cap with a spring loaded plunger. The plunger engages in a groove in the spool extension and holds the spool in the desired position.

7. **Tandem Operation** - Tandem operation permits operation of two banks of valves from the same pumping source. An internal plug in the outlet section of the first bank (Figure 10) separates the by-pass passage from the tank passage. Cylinder exhaust oil is returned to tank via the alternate discharge port, and by-pass oil is directed out the primary discharge port to the by-pass port of the bank.

In Figure 10, either bank can be operated separately or both simultaneously. This is possible because of the tandem by-pass connection from the inlet connection of the first bank to the F inlet connection of the second bank. If neither bank is operating, part of the fluid flows through both by-pass passages directly to reservoir. The balance is diverted through the tank passage of the first section as shown in Figure 2.

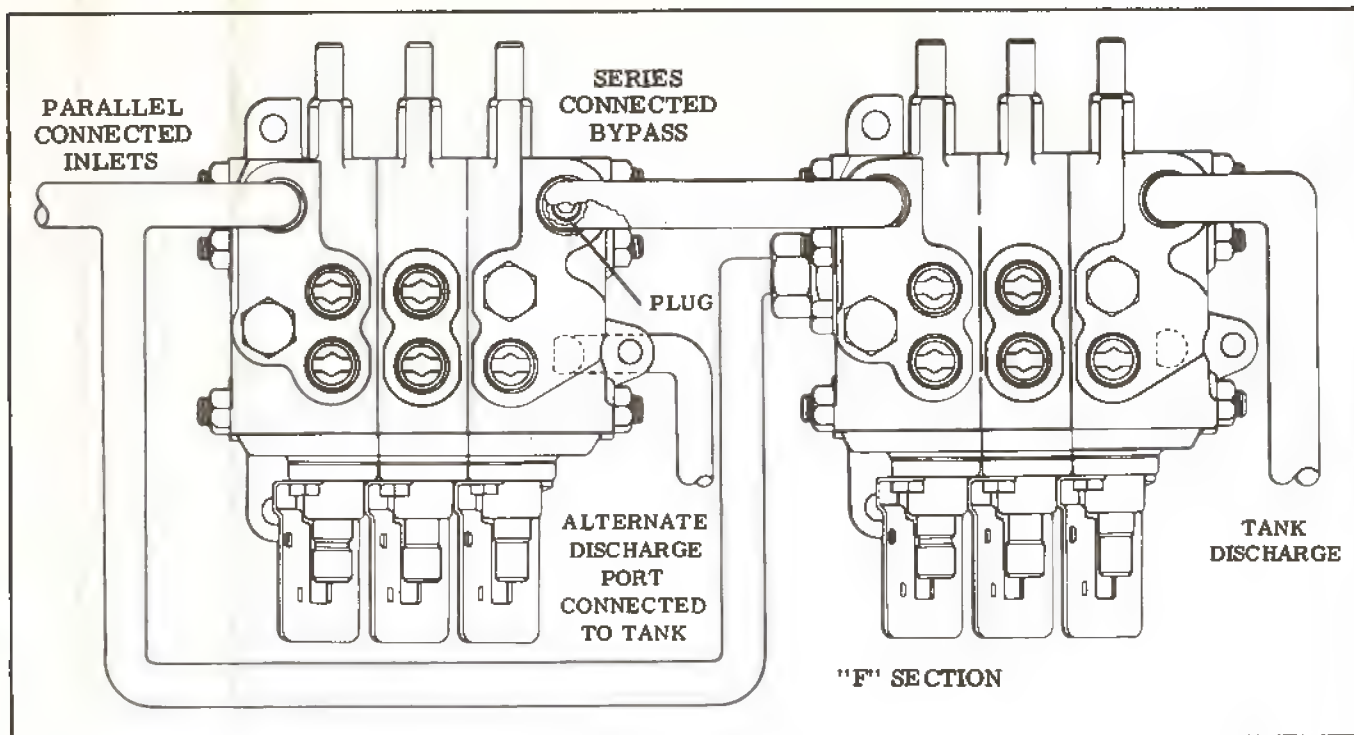


Figure 10

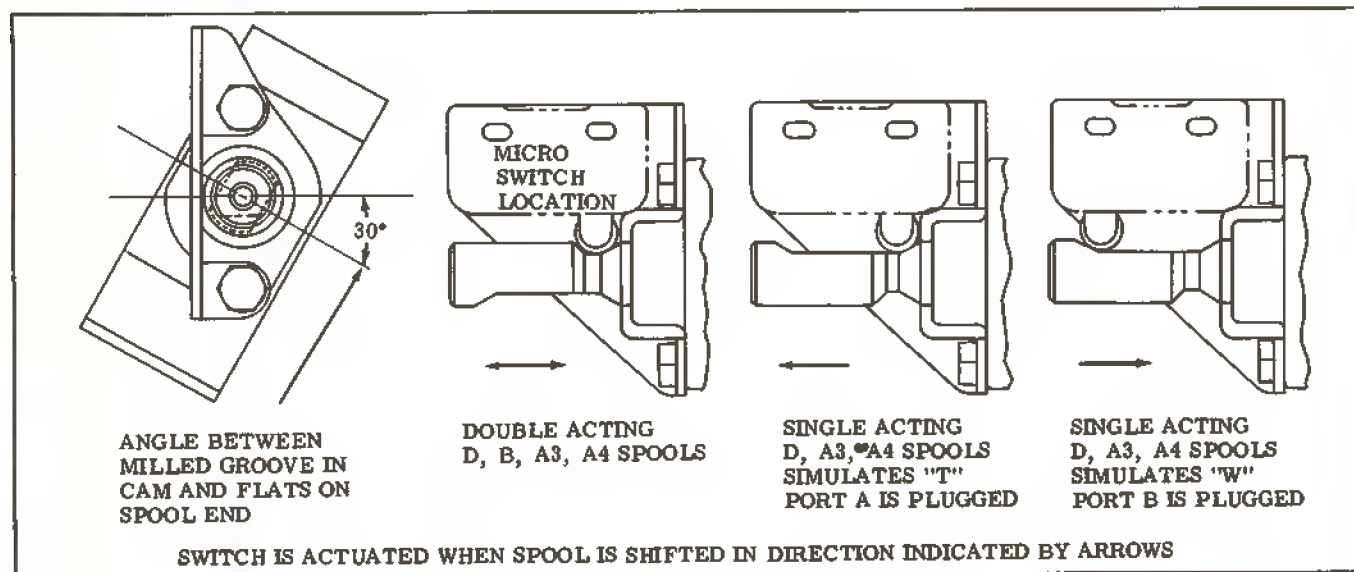


Figure 11

In some cases, it is desirable to have tandem valves connected in series where the second bank is dependent upon the operation of the first bank. The first bank has control priority because the tandem by-pass connection is not used. The cylinder by-pass oil of the first bank is directed out of primary discharge port to the inlet port of the second bank. Use a "K" inlet section in the first bank if full flow is desired to the second bank. Otherwise reduced flow will be encountered.

8. **Electric Switch Section** - Provision is made to actuate a switch to start the hydraulic power source on electric powered machines only when it is needed. For "T" spool operation, the "A" port must be plugged. "W" spool operation requires that port "B" be plugged.

All D, T or W electric limit switch models are supplied with "D" spools only. "T" or "W" spool operation is accomplished by mounting the switch or rotating the spool extension as shown in Figure 11.

9. Narrow By-Pass Sections - Narrow by-pass sections have narrower by-pass grooves in the spools. These provide better metering for low volume applications.

C. NON-OPERATING SECTIONS

The CM11-21 valve non-operating sections are the "E" and "L" outlet sections. These sections do not have operating spools. The functions of these sections are as follows:

1. "E" Outlet Section - The "E" type section provides an outlet section by which the by-pass feature for pump unloading is extended to a subsequent valve bank (tandem operation). It is generally used

in conjunction with the "F" type inlet section on the subsequent valve bank assembly. This "E" type section is only used with one-spool banks.

2. "L" Outlet Section - The "L" type section is basically the same section as the "E" section except it provides only one connection for exhaust oil and is used as the last section on a single-spool bank where tandem operation is not required.

NOTE

It should be noted that the pressure drop across the valve, when used in series operation, will be the sum of the pressure drops for each section.

SECTION IV - INSTALLATION AND OPERATING INSTRUCTIONS

A. INSTALLATION DRAWINGS

Installation drawing 303 should be consulted for installation dimensions.

B. MOUNTING

These valves can be mounted in any position. Enough clearance must be left to provide access to the port connections and to permit actuating the control mechanism. The valves should be securely bolted to the mounting surface.

NOTE

Valves should be mounted on a relatively flat surface to prevent possible distortion of the valve bodies.

C. PORT CONNECTIONS

Except for the alternate discharge port, all connections are compatible with standard SAE fittings and "O" ring seals. It is only necessary to tighten fittings so that there is a firm metal-to-metal contact.

D. RELIEF VALVE

Relief valve sub-assemblies in the inlet section are preset and tested by Vickers for given pressure settings. Selection of the relief valve setting is based on the work requirements of the system. If a different relief valve setting is required, the valve sub-assembly should be replaced.

E. TANDEM INSTALLATION

1. Port connections for tandem series operation are shown in Figure 10.

2. The outlet section of the first bank must be an "E" section which is equipped with a plug (see Figure 10) to block the primary discharge port from the reservoir. The alternate discharge port must be connected to the reservoir.

NOTE

Slight leakage past the internal plug is permissible. The plug should not be tightened excessively, as there is the danger of distorting the body and causing the spool to bind.

F. MICRO-SWITCH AND CAM INSTALLATION

1. Figure 11 illustrates the correct mounting positions for the micro-switch, bracket and cam.

2. To convert a standard section to an electric switch section, the end cap screws must be removed to attach the bracket. The cam must be pressed into the spool at the correct angle with the flats on the spool end as shown in Figure 11. Secure cam in spool with a good grade of epoxy adhesive.

CAUTION

Use caution while inserting cam into spool to avoid damaging nylon cam.

G. HYDRAULIC TUBING

1. The number of bends in tubing must be kept to a minimum to prevent excessive turbulence and friction of oil flow.

2. Tubing must not be bent too sharply. The minimum radius for bends is three times the inside diameter of the tube.

3. To minimize flow resistance and the possibility of leakage, only as many fittings and connections as are necessary for proper installation should be used.

4. All tubing must be thoroughly cleaned before installation to remove dirt, rust and scale. Recommended methods of cleaning are sand blasting, wire brushing and pickling.

NOTE

For instructions on pickling, refer to Vickers Instruction Sheet M-9600.

H. HYDRAULIC FLUID RECOMMENDATIONS

GENERAL

The oil in a hydraulic system serves as the power transmission medium. It is also the system's lubricant and coolant. Selection of the proper oil is a requirement for satisfactory system performance and life. Oil must be selected with care and with the as-

sistance of a reputable supplier.

Refer to Vickers oil recommendations for mobile hydraulic systems, data sheet M-2950-S.

Where special considerations indicate a need to depart from the recommended oils or operating conditions, see your Vickers sales representative.

SECTION V - SERVICE, INSPECTION AND MAINTENANCE

A. SERVICE TOOLS

No special tools are required to service Vickers CM11-21 series, multiple unit valves.

B. INSPECTION

Periodic inspection of spool operation, oil condition and pressure connections saves time-consum-

TABLE III - TROUBLE, CAUSE AND REMEDY CHART

TROUBLE	PROBABLE CAUSE	REMEDY
Oil leaks at either end of spool. Spring-centered spools do not return to neutral.	Defective "O" rings in valve body.	Replace "O" rings.
	Broken springs.	Replace springs.
	Bent spool.	Replace with new section of same size and type.
	Foreign particles.	Clean system and valve.
	Misalignment of operating linkage.	Check linkage for binding condition.
	Valve bank improperly torqued.	Retorque nuts to specified ratings.
Detent type spools will not stay in detent position.	Worn detent barrel.	Replace detent barrel.
	Weak or broken detent spring.	Replace detent spring.
No motion, slow or jerky action of hydraulic system.	Relief valve not properly set, or stuck in base and/or worn.	Repair, clean and readjust.
	Dirt or foreign particles lodged between relief valve control poppet and seat.	Disassemble, clean and reassemble.
	Valve body cracked inside.	Replace valve section.
	Spool not moved to full stroke.	Check travel.
No relief valve action (high pressure).	Small particle of dirt plugging orifice in relief valve sub-assembly.	Remove relief valve and check hole. If blocked, clear hole.
	Relief valve sub-assembly installed backwards.	Install properly.
Load will not hold.	Oil bypassing between spool and body.	Replace valve.
	Oil bypassing piston in cylinder.	Repair or replace cylinder.
	Spool not centered.	Refer to above spool remedies.
Load drops when spool is moved from neutral to a power position.	Dirt or foreign particles lodged between check valve ball and seat.	Disassemble, clean and reassemble.
	Scored or sticking check valve.	Replace poppet.

ing breakdowns and unnecessary parts replacement.

1. All hydraulic connections must be tight. Loose connections not only allow leakage, but also permit air to be drawn into the system, resulting in noisy and erratic operation.

2. Spools should return to neutral automatically when the control is released. The standard centering spring force is approximately 28 pounds with the spool in the neutral position, and approximately 56 pounds with the spool in the shifted position. If more force is necessary, the spool may be binding or control linkage may be faulty.

3. System filters and reservoir should be checked periodically for foreign particles. If excessive contamination is found, the system should be drained. The reservoir must be cleaned thoroughly before refilling.

C. ADDING FLUID TO THE SYSTEM

When hydraulic fluid is added to the system, it should be pumped through a 25 micron filter. If such a filter is not available, or practical to use in the field, a funnel with a fine wire screen (200 mesh or better) can be used.

SECTION VI - OVERHAUL

A. GENERAL

During disassembly, particular attention should be given to identification of parts for reassembly. Spools are selectively fitted to valve bodies and must be returned to the same bodies from which they were removed. Valve sections must be reassembled in the same order.

Figure 12 is an exploded view showing the proper relationship for reassembly. Reference is made to these figures in the procedures which follow.

B. DISASSEMBLY

1. Controls - Be sure the unit is not subjected to pressure. Disconnect and cap all lines and disconnect linkage to the spool. If hand levers are used, remove the "E" washers which retain the fulcrum rod and remove the rod, levers and pivot pins.

2. Attaching Parts - Remove the four tie studs and nuts and separate the valve sections. Be careful not to destroy or lose spacers.

3. End Caps - On CM11-21 models remove the micro-switch from the bracket. Remove the two screws which secure the spool end cap and remove the cap (and switch bracket, if used). If the cap has a detent assembly, screw out the detent plug

It is important that oil be clean and free of all substance which will cause improper operation and excessive wear of the pump or other hydraulic units in the system. Be sure to purge all air from the system.

D. LUBRICATION

Internal lubrication is provided by system oil.

E. REPLACEMENT PARTS

Only genuine parts manufactured or sold by Vickers should be used as replacement parts for these valves. Only Vickers knows the true quality level required of each part. These are listed in the applicable parts catalogs, copies of which are available on request.

F. TROUBLESHOOTING

Table III lists the difficulties which may be experienced with the unit and hydraulic system. It indicates the cause and remedy for each of the troubles listed. It should always be remembered that pressure and delivery are factors which are usually dependent upon each other. Adequate pressure gage equipment and a thorough understanding of the operation of the complete hydraulic system are essential to diagnose improper operation.

and remove the spring and piston. Remove the "O" ring from the cap.

4. Operating Spool - Slide the spool out of its bore and remove the "O" rings from the groove in the spool and from the valve body around the spool bore. Do not remove the centering spring, retainers or the spool extension unless it is necessary to replace them.

5. Check Valve - Grip the stem of the check valve plug with pliers and pull it out of the valve body. Remove the "O" ring and back-up ring. Remove the spring and ball from the valve body.

6. Relief Valve Sub-Assy - Screw out the plug which retains the relief valve and remove the "O" ring from the plug. Remove the spring and the relief valve sub-assembly. In F* sections, remove the solid plug.

7. Valve Body - Remove the plug and "O" ring from the blocked cylinder port on models with a single acting spool. If the alternate discharge port is plugged, it is not necessary to remove the plug unless the body is to be replaced. On F* bodies, remove the fitting, "O" rings and back-up ring.

C. CLEANING, INSPECTION AND REPAIR

1. Discard all old seals. Wash all parts in a

clean mineral oil solvent and place them on a clean surface for inspection.

2. Carefully remove burrs by light stoning or lapping. Be certain there is no paint or burring on mating surfaces of valve bodies.

3. Inspect the valve spools and bores for burrs and scoring. If scoring is not deep enough to cause objectionable leakage, the surfaces can be stoned or polished with crocus cloth. If scoring is excessive, the valve body and spool must be replaced. Check the valve spool for freedom of movement in the bore.

4. Check the relief valve for smooth movement in its bore. The valve should move from its own weight.

D. ASSEMBLY (Figure 12)

NOTE

Coat all parts with clean hydraulic oil to facilitate assembly and provide initial lubrication. Petroleum jelly can be used to hold seal rings in place on assembly.

1. Valve Body - On models with single-acting spool, install the "O" ring on the port plug and plug the appropriate cylinder port. Tighten the plug securely, but DO NOT over tighten. On F* models, install the back-up ring and then the "O" rings on the fitting. Tighten the fitting securely, but DO NOT over tighten.

CAUTION

Hex head of relief valve must face outside of unit.

2. Relief Valve - Install the "O" ring on the relief valve plug. Place the relief valve assembly in its bore, HEX NUT END UP. Install the spring and plug and tighten the plug securely but DO NOT over tighten.

3. Check Valve - Install a new back-up ring and

"O" ring on the check valve plug with the "O" ring toward the spring and ball. Place the ball and spring in the body and install the plug. Be sure the hole in the plug lines up with the stud hole in the body. Check valves are not used in "B" spool sections.

4. Operating Spool - If the centering spring was removed, install the spring and retainers on the spool. Place the "O" ring in the groove around the spool bore and install the "O" ring on the spool. Install the spool in the bore. On electric switch models, be certain the cam extension is in the correct position.

5. End Cap - Install the "O" ring in the end cap groove and install the cap, switch bracket (if used) and attaching screws. Torque the screws securely. On models with detents, grease all the detent parts. Install the end cap and check for proper spool extension alignment. Install the piston, spring and plug. Be sure to screw the plug in all the way.

6. Assembly of Unit

CAUTION

Make sure all mating surfaces of valve bodies are free of burrs and paint.

Install seal rings and the seal ring retainer in the grooves in the body of each inlet and center section. Use petroleum jelly to hold the seals in place. Carefully place the sections together in the same order in which they were removed. Coat the stud threads with "Loctite" or similar sealant and install the studs. Tighten the nuts to 17 pounds foot torque. If levers are used, install pins in each spool and assemble the levers, fulcrum rod and "E" washers.

SECTION VII - TESTING

Vickers, Incorporated application engineering personnel should be consulted for recommendations on test stand circuit requirements and construction. If test

equipment is available, valves should be tested at the recommended flow and pressure shown on installation drawing 303.

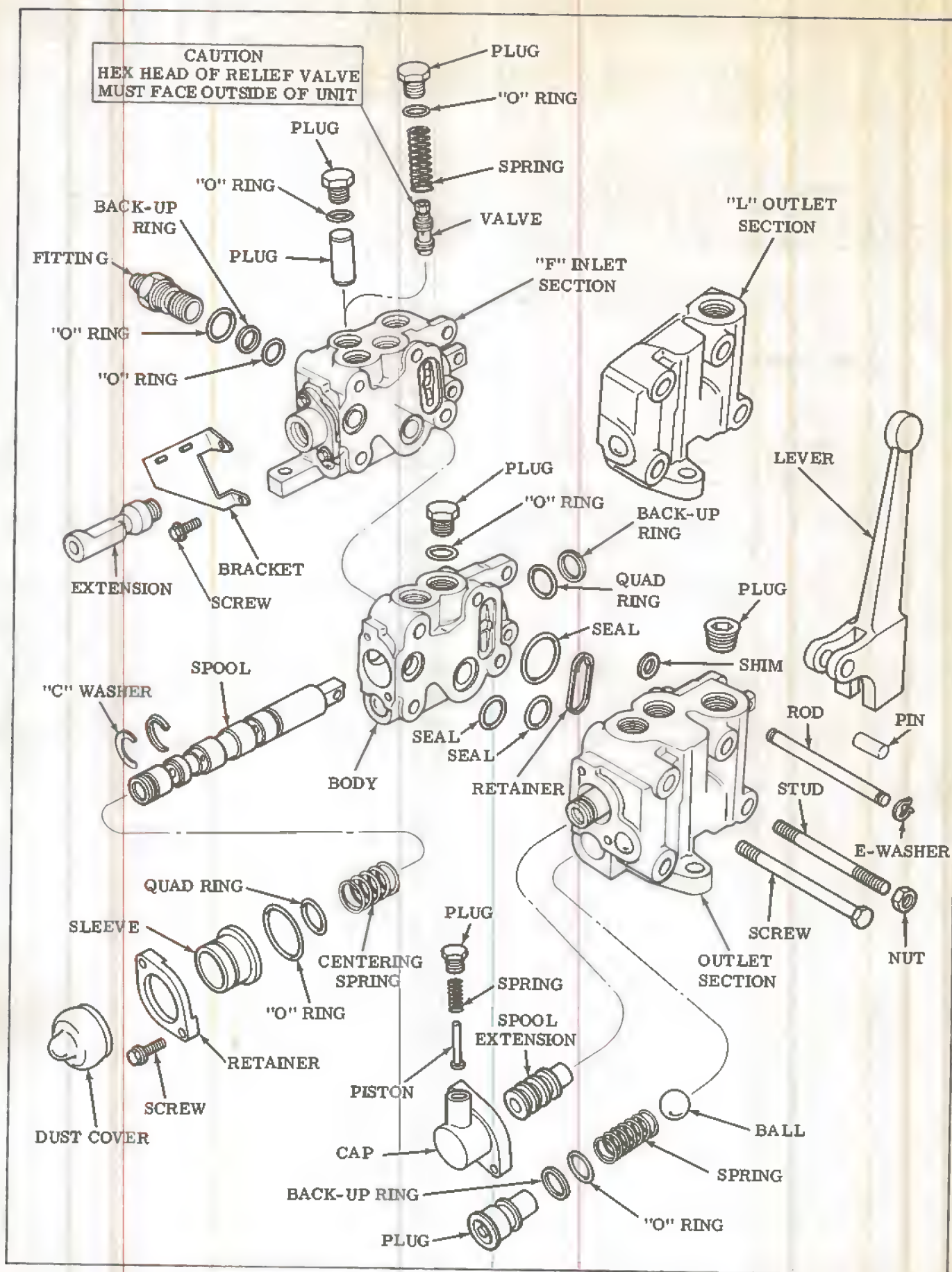


Figure 12

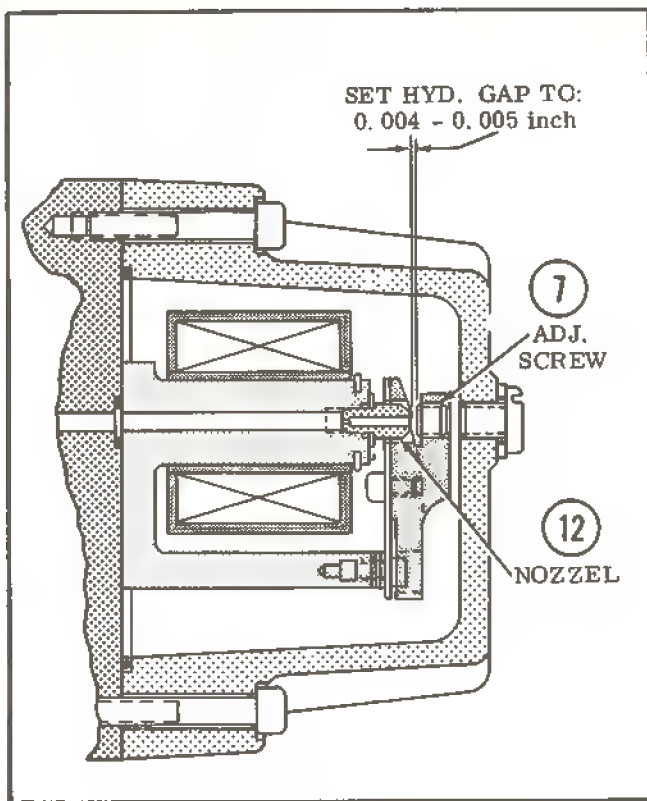


Figure 6. Setting hydraulic gap.

7. Install manual relief valve parts (52) through (41) into cover (55). If a new seat (53) was installed, coin piston (50) to seat (53). Use a six inch (6") piece of tubing to hold the piston. Insert piston and tubing into valve until piston rests against seat (53). Gently tap the tubing (while holding tubing centered in the bore); this mates the piston to the seat. Remove piston (50) and tubing, then remove piston from the tubing. Install parts associated with piston into valve, (49) through (41).

8. Install parts (40) through (37). Plug (40) must be below the mounting face of body (38) after installation. Cross torque screws (37) to 42 lb in., (4.7 N.m), maximum.

9. Install check valve parts (36) through (31). If a new ball or seat is used, coin the ball and seat prior to installation.

10. Install plug (30) and blocking valve assembly parts (29a) through (24). Filter screen (28) fits into spool (27) with screen side inward. (Use petroleum jelly to retain filter screen within spool at assembly.) Important: Install button in manual position, (reversed from that shown in figure 3). The blocking valve must prevent flow to the flapper orifice. (Initial test procedure set up).

11. Install parts (23) through (21). Torque screws (21) to 40 lb. in., (4 - 4.5 N.m).

12. Install "O" ring (20) in place over coil (19) wires. Slide coil (19) over frame (22) while inserting wires into body (38) wiring cavity. Gently press "O" ring (20) and wires through body opening until coil bottoms against the screw heads (21) that secure frame (22).

13. Install parts (18) through (12). Dampening shim (13) exists on 1000 PSI models only. Thread nozzle (12) through coil retainer (14) into frame (22). Use a 5 mm open end wrench or a small adjustable wrench to tighten the nozzle. Do not overtighten nozzle (12) or accidentally strike the nozzle orifice face with the wrench.

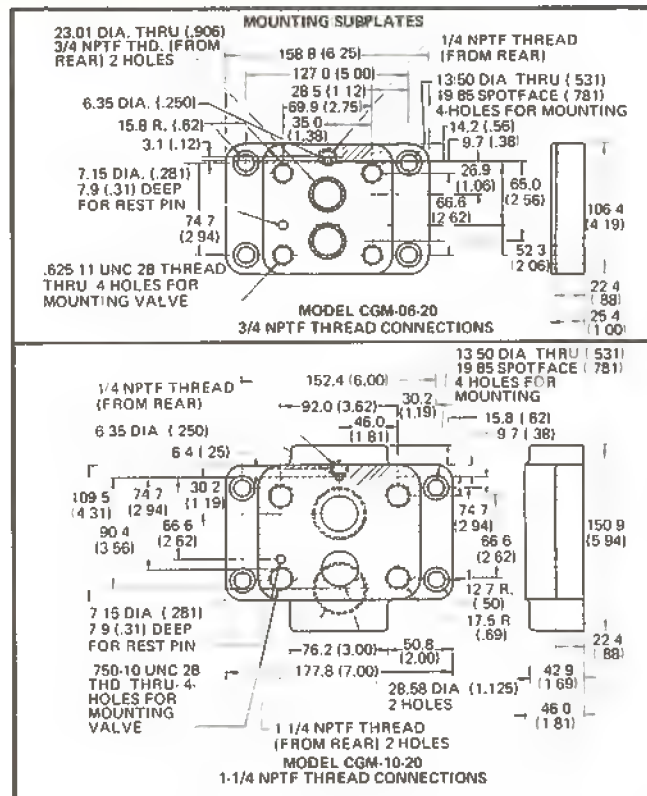


Figure 7. CGE*-20 valve mounting data.

Damage to the orifice face could reduce the maximum pressure setting, (due to leakage past the orifice). See figure 5 for location of dampening shim.

14. Assemble leaf spring (9) and flapper plate (S/A) (8) with screws (10). Inspect the leaf spring; if the leaf spring is bowed, position the bow outward. Torque screws (10) to 12-14 lb. in., (1.4 - 1.6 N.m). Screws (10) should straighten the leaf spring against the flapper plate.

NOTE

In the following step, one master shim (11a) (thick) and four adjustment shims (11) (thin) are normally used. The shims set the magnetic gap of the valve.

15. Insert screws (6) and washers (6a) through flapper plate S/A (8) opening into leaf spring (9). Hold screws in place and locate shims over screws against leaf spring (9). Thread screws into frame (22) lightly. Position flapper plate S/A (8) to prevent mechanical contact with side of nozzle (12). Torque screws (6) to 12 - 14 lb. in., (1.4 - 1.6 N.m). Check the magnetic gap as follows:

a. 1000 PSI models:

Refer to figure 5 and carefully measure the distance between leaf spring (9) and dampening shim (13). Use a feeler gage. The distance should be 0.017 to 0.021 inches, (0.43-0.53 mm). Add or remove shims (11) to meet this dimension.

b. 3000 PSI models:

Refer to figure 5 and carefully measure the distance between leaf spring (9) and frame (22). Use a feeler gage. The distance should be 0.035 to 0.037 inches, (0.89-0.94 mm). Add or remove shims (11) to meet this dimension.

16. If adjustment screw (7) was removed from flapper plate (8), thread a new adjustment screw (7) into flapper plate (8).

Measure the hydraulic gap with a feeler gage to set the clearance between nozzle (12) and adjustment screw (7). The gap should be 0.004 - 0.005 inch, (0.10 - 0.13 mm). This applies to 1000 & 3000 PSI models. Refer to Figure 6.

Sec SAE II - TEST PROCEDURE

A. TEST CONDITIONS

Hydraulics:

Fluid medium SAW 10W oil or equivalent
Fluid Temperature $100 \pm 5^\circ \text{F}$.
Maximum Pressure 3500 PSI

TEST VOLUME:

CGE-06 20 USGPM
CGE-10 50 USGPM

B. ELECTRICAL SPECIFICATIONS

An adjustable current source from zero (0) to 500 milliamperes is required. Vickers EMCS-P-30 is recommended. Refer to installation drawing 521557.

C. TEST. (Preliminary Adjustments)

CAUTION

The CGE pilot valve is externally drained through the cover. Connect drain line into the cover with a 0.5625-18 UNF-2B straight thread connection for 0.375 O.D. tubing. Drain line must be full size, unrestricted and connected directly to the reservoir so that it terminates below the fluid level. No other lines are to be connected to this line.

NOTE

System filtration should be 35 micron absolute full flow to prevent contamination of the pilot valve.

1. Before mounting the assembled valve for test, manually move piston (59, figure 4) to full stroke with a hex wrench or similar tool. If piston (59) binds refer to paragraph VI, step E.12. and paragraph VI, step F.6.

NOTE

A suitable subplate is required to mount the valve. A CGE subplate properly piped is recommended. See figure 7.

NOTE

A sample hydraulic and electrical circuit is shown in figure 8. Modify an existing test stand or obtain necessary components to assemble the test circuit.

NOTE

If the valve is an -S6 model, connect a

17. Install parts (5) through (1). Cross torque screws (3) to 35-40 lbf. in., (4 - 4.5 N.m).

3000 PSI, 35 micron filter to the main stage of the valve. Filter ports are located on the front side of the main stage. See figure 9.

2. Connect valve to the test circuit and attach power supply (12, figure 8). The connections can be made without regard to polarity.

3. Set dither adjustment on power supply to minimum.

4. Turn power supply current control knob to zero (0).

CAUTION

In the following step, if milliammeter (11, figure 8) reads in reverse, reverse the meter connecting wires.

5. Crack the power supply control and observe milliammeter for polarity. Correct wiring if necessary. Return control to zero current.

6. Switch directional valve (8, figure 8) to allow flow through flow meter and adjust flow rate for valve under test. (Flow rates tabulated in paragraph VII.A. Test Conditions).

7. Adjust relief valve (2, figure 8) to minimum pressure and open globe valve (1).

8. Switch directional valve to center blocked condition. Gradually close globe valve (1, figure 8) and adjust relief valve (2) until pressure reading on gage (7) is 3750 PSI. Globe valve must be completely closed at completion of this step.

NOTE

Needle valve (6, figure 8) is used as a snubber for gage (7).

D. MANUAL ADJUSTMENT TEST

1. Switch directional valve to divert flow through the valve under test (10, figure 8). Turn relief valve adjustment screw (41, figure 3) all the way in. Pressure should be within range "A", perform the following adjustment procedure.

MODEL	"A" PSI	"B" PSI	"C" PSI	"D" in ³ /min.	"E" PSI	"F" PSI
CGE-**-1	1200/1300	1000	700	15	125	1250
CGE-**-3	3450/3700	3000	2500	45	1500	3500

Table 4.

WARNING

To prevent personal injury, remove all power from the hydraulic system or divert all system flow to the reservoir through flow meter (9, figure 8) when work is performed to the valve under test.

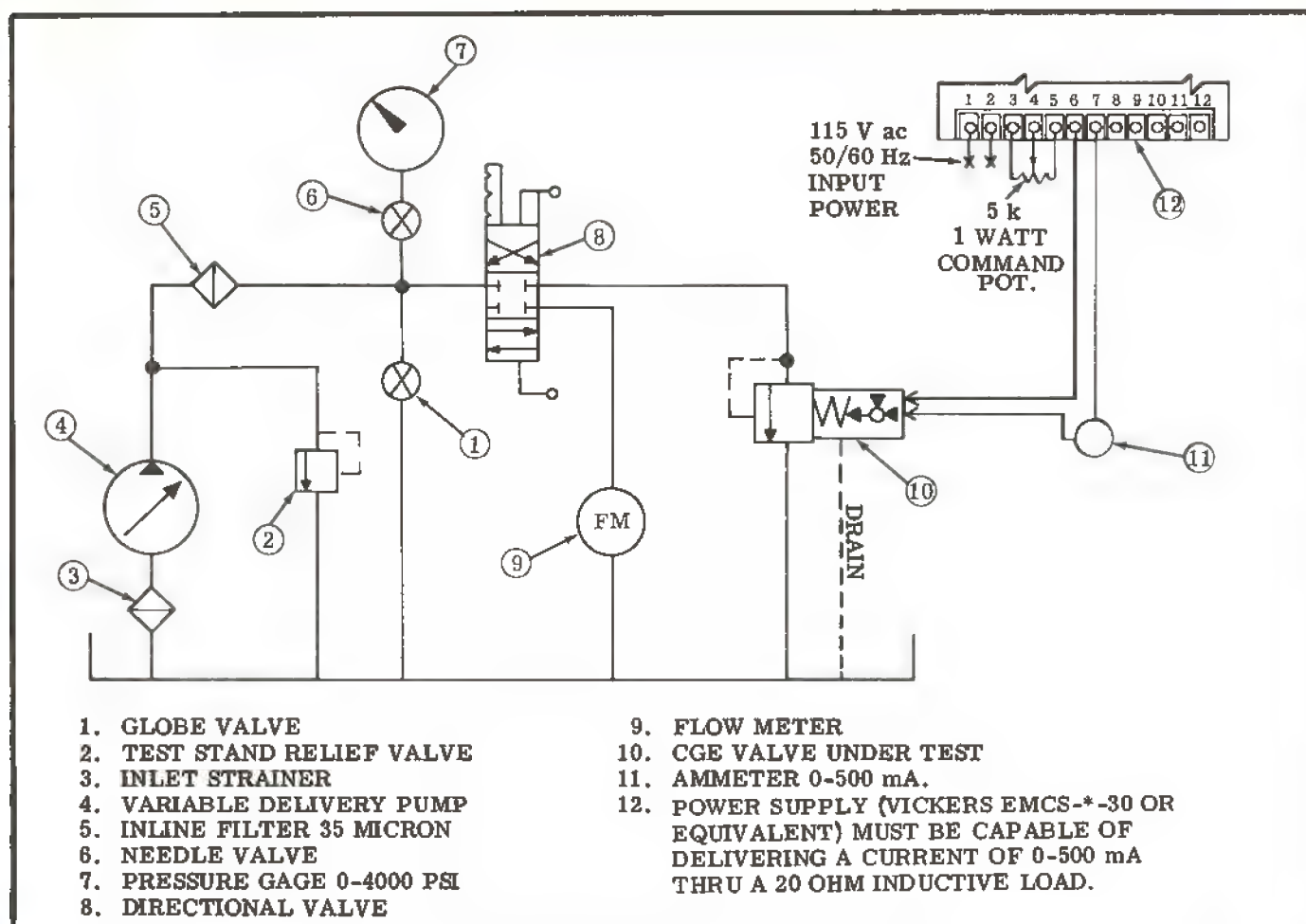


Figure 8. Hydraulic Test Circuit for CGE Valve.

NOTE

In the following step, adding shims increase pressure while removing shims decrease pressure.

2. CGE--*-1-2*

Add or remove shims to bring pressure shown on gage (7, figure 8) within range "A" of table 4. Use the 0.025 inch thick shim, (44, figure 3), for a 100 PSI change.

CGE--*-3-2*

Add or remove shims to bring pressure shown on gage (7, figure 8) within range "A" of table 4. Use the 0.025 inch thick shim, (44, figure 3), for a 230 PSI change and the 0.250 thick shim for a 700 PSI change.

3. Turn relief valve adjustment screw to pressure "B" shown in table 4. Check for porosity and external leaks. Drop pressure to value "C" with globe valve 1, (figure 8), and check the leakage from discharge port, not to exceed "D".

4. Adjust relief valve pressure setting from "C" down to "E" then up to "F" for pressure range test. Tighten lock nut (42, figure 3).

5. Switch directional valve (8, figure 8) to divert flow through flow meter.

6. Remove plug (24, figure 3) and reverse button (26, figure 3) to the normal position. Reinstall plug (24) and secure.

E. ELECTRICAL PILOT ADJUSTMENT

1. Switch directional valve (8, figure 8) to divert flow to the valve under test (10, figure 8).

2. Make sure dither is off (dither control fully counterclockwise). Increase current to the valve under test until rated pressure is obtained. The current at this time should be 475 to 500 millamperes for the 3000 PSI models and between 465 and 500 for the 1000 PSI models. If the current is not within this range, remove current, shift directional valve (8, figure 8) to direct oil to the flow meter and remove pilot valve cover (4, figure 3). If the current reading is low, add shims (11, figure 3) as required. If current reading is high, remove shims as needed. Each shim will change the pressure setting approximately 25 PSI on 1000 PSI models and 150 PSI on 3000 PSI models.

3. Adjust the clearance between nozzle (12, figure 3) and flapper adjustment screw (7, figure 3) to be between 0.004 - 0.005 inch, (0.10 - 0.13 mm). Use a feeler gage for this adjustment.

4. Assemble cover (4, figure 3) to the pilot valve with screws (3, figure 3).

5. Repeat steps E.1. and E.2. to verify adjustment. Repeat the complete "Electrical Pilot Adjustment Procedure", until noted results are obtained.

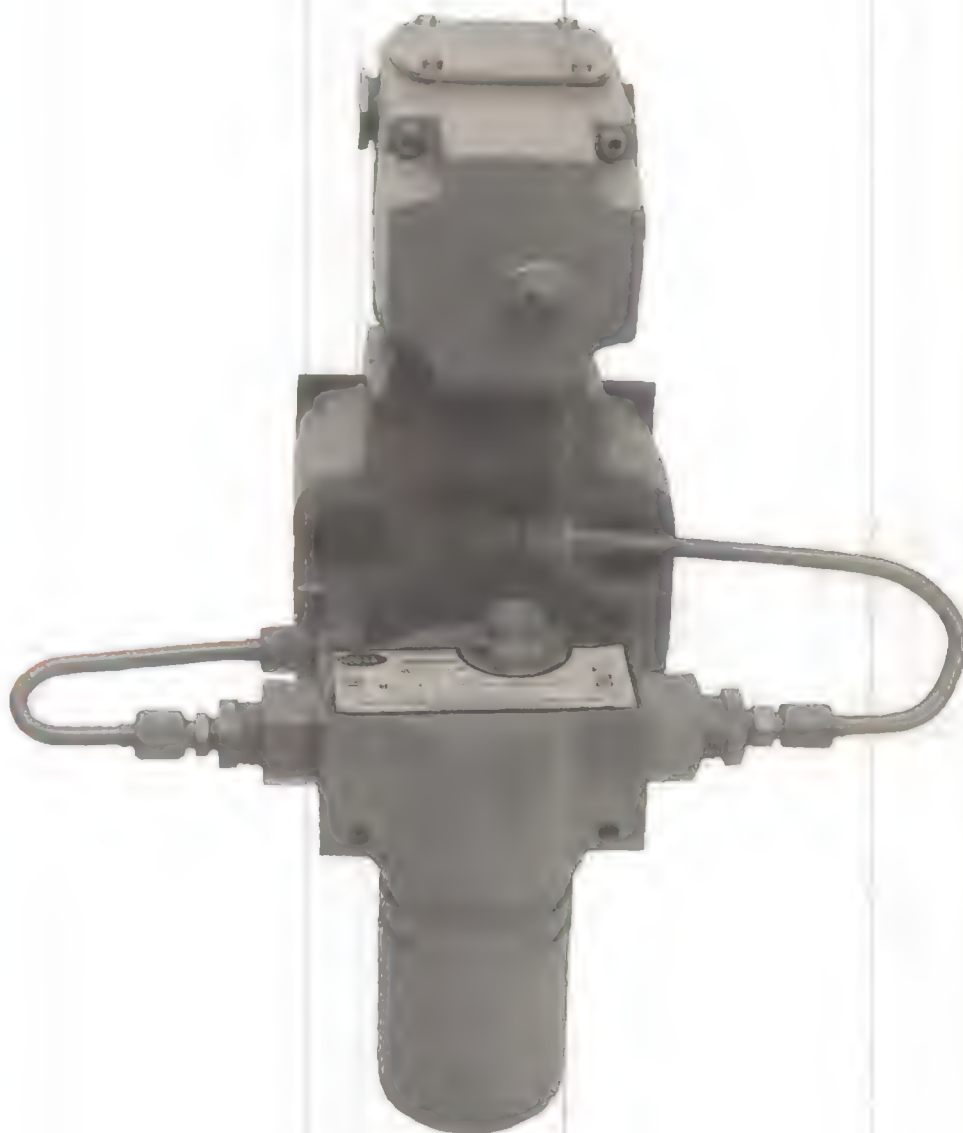


Figure 9. Filter connection for S-6 models.

Service Parts Information



LEVER/CAM OPERATED MINIATURE 4-WAY DIRECTIONAL VALVE

DG17V-3-**(2)(L)-40

DG20V-3-**(2)(L)-40

*** NOTE**
COLLAR LOCATION SHOWN FOR "A" MODELS AT LEVER POSITION #3. IF LEVER POSITION #1 IS DESIRED, LOCATE COLLAR BEHIND SPRING TO OBTAIN "A2". SEE MODEL CODE.

⊖ ASSEMBLE PILOT SHAFTS FROM THE SIDE OF COVER AS SHOWN.

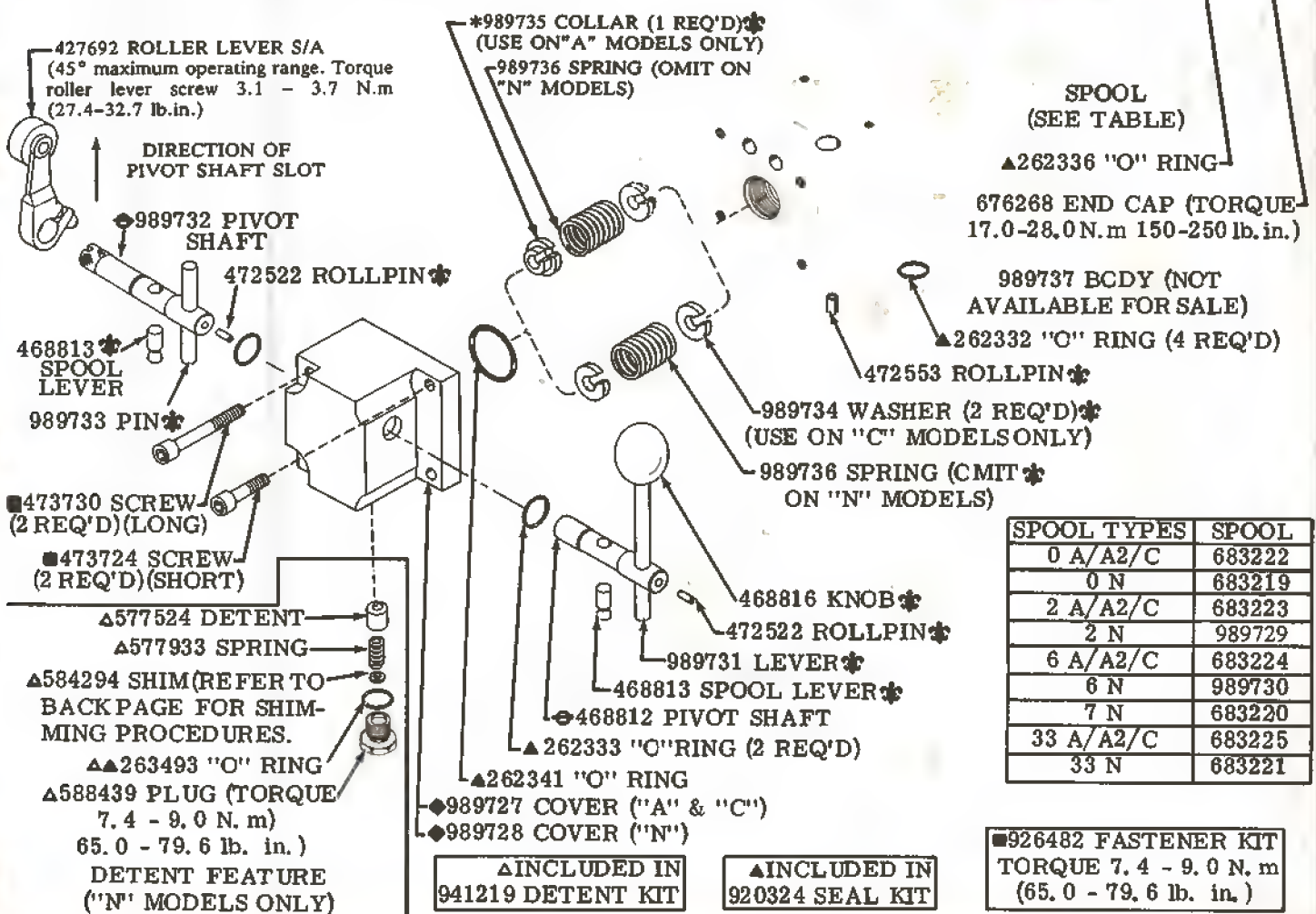
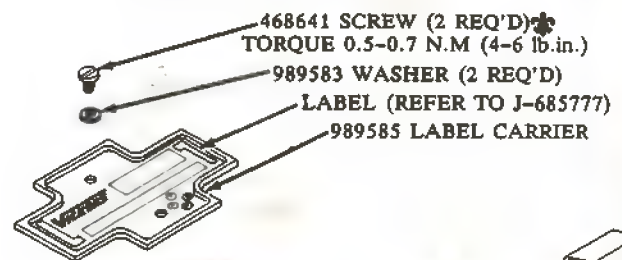
NOTE: ASSEMBLE CENTER LINE OF ROLLER LEVER S/A PARALLEL TO PIVOT SHAFT SLOT.

PARTS PREFIXED WITH ▲ AND ■ SOLD IN KIT FORM ONLY.

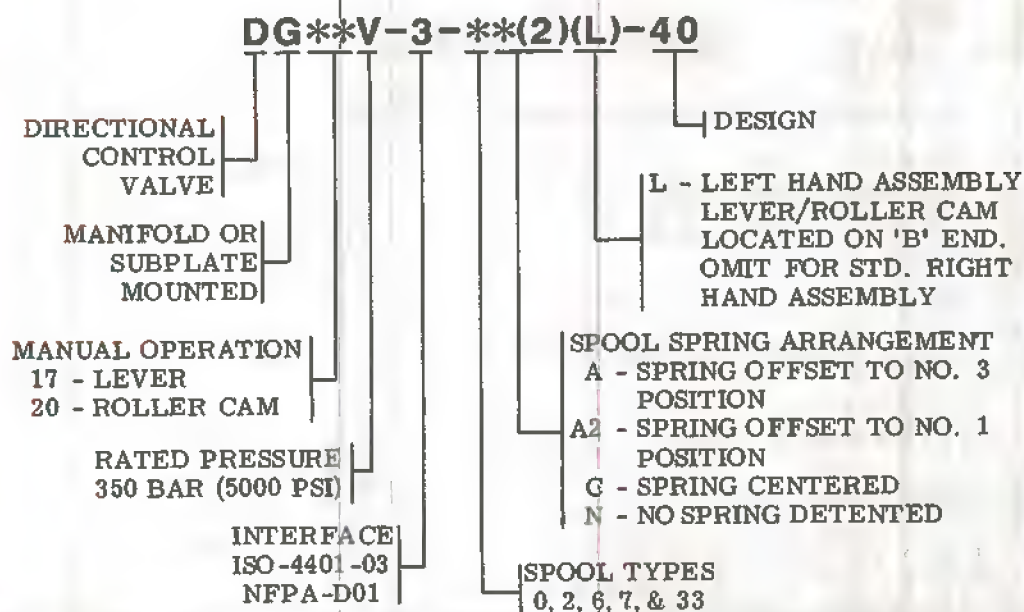
◆ NOT AVAILABLE FOR SALE.

AS THIS COMPLETE UNIT CAN BE REPLACED AT A NOMINAL COST, FACTORY REPAIR IS NOT PRACTICAL. KITS ARE AVAILABLE TO SUPPORT CUSTOMER REPAIR.

RIGHT HAND ASSEMBLY SHOWN. FOR LEFT HAND, ALL PARTS, EXCEPT BODY, ARE REVERSED. CHANGE THE NAMEPLATE LABEL TO REFLECT NEW MODEL CODE.



MODEL CODE BREAKDOWN



SHIMMING PROCEDURE

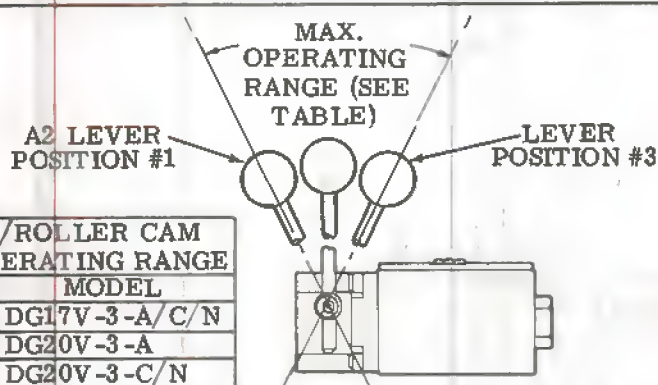
If replacement of the spool, detent, or spring is required, perform the following procedure to maintain a nominal detent force of 5kg, (11 lbs), on detented 'N' models only.

1. Turn valve over so porting is up.
2. Install detent and spring into valve cover. Make sure detent is located in a groove of the spool.

3. Measure 'X' distance between top of spring and spot face.
4. Use this measurement to determine shims from table.
5. Install shims and thread plug in place with a torque of 7.4-9.0 N.m (65.0-79.6 lb.in.)



'X' DIMENSION		SHIMS REQ'D
mm	in.	
1.39	.054	0
1.40 - 1.70	.055 - .067	1
1.71 - 2.00	.068 - .080	2
2.01 - 2.30	.081 - .093	3
2.31 - 2.60	.094 - .106	4



LEVER/ROLLER CAM MAX. OPERATING RANGE	
RANGE	MODEL
500	DG17V-3-A/C/N
450	DG20V-3-A
400	DG20V-3-C/N

* AVAILABLE IN LOT KITS (25 PCS.)	
PART #	KIT #
468641	944012
468813	944016
468816	944021
472522	944022
472553	944008
989731	944030
989733	944017
989734	944020
989735	944018
989736	944023

For satisfactory service life of these components in industrial applications, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from Vickers OFF, OFR, and OFRS series are recommended.

Litho in U. S. A.

Multi-Pressure Relief Valves

(F3)-C/G/S/T-06/10**(*)-(V)-DG-8C(L)**-(V)M-(S*)*****-(L)*****-40/50



Vickers Incorporated
A TRINOVA Company
5445 Corporate Drive
P. O. Box 302
Troy, Michigan 48007-0302
U.S.A.

Released 07-01-91

I-3784-S

NOTE: Lubricate all parts & seals with a thin coat of oil at assembly.

DG4V3(S)-8C(L)-60 Pilot valve (Refer to parts drawing for detailed information).

255698 Bolt kit (Torque 4.5-5.6 N.m.)
40-50 lb.in. (Pilot valve to adapter plate mounting) Not shown

255651 Bolt kit (Torque 14.9-20.3 N.m.)
11-15 lb.ft. (Adapter plate to cover mounting)

422814 Adapter plate

113000 Plug (4 Req'd)

262334 "O"Ring (4 Req'd)

1649 Ball (2 Req'd) (C*-06 only)

Cover (see table)

290057 Piston (3 Req'd)

Cover spring (see table)

262332 "O"Ring (3 Req'd)

197570 BU-Ring (3 Req'd)

370701 Plunger (3 Req'd)

* 292230 ADJ. screw (3 Req'd)

* 1485 Locknut (3 Req'd)

* 283949 Lockscrew (3 Req'd)

64520 Washer (As req'd)

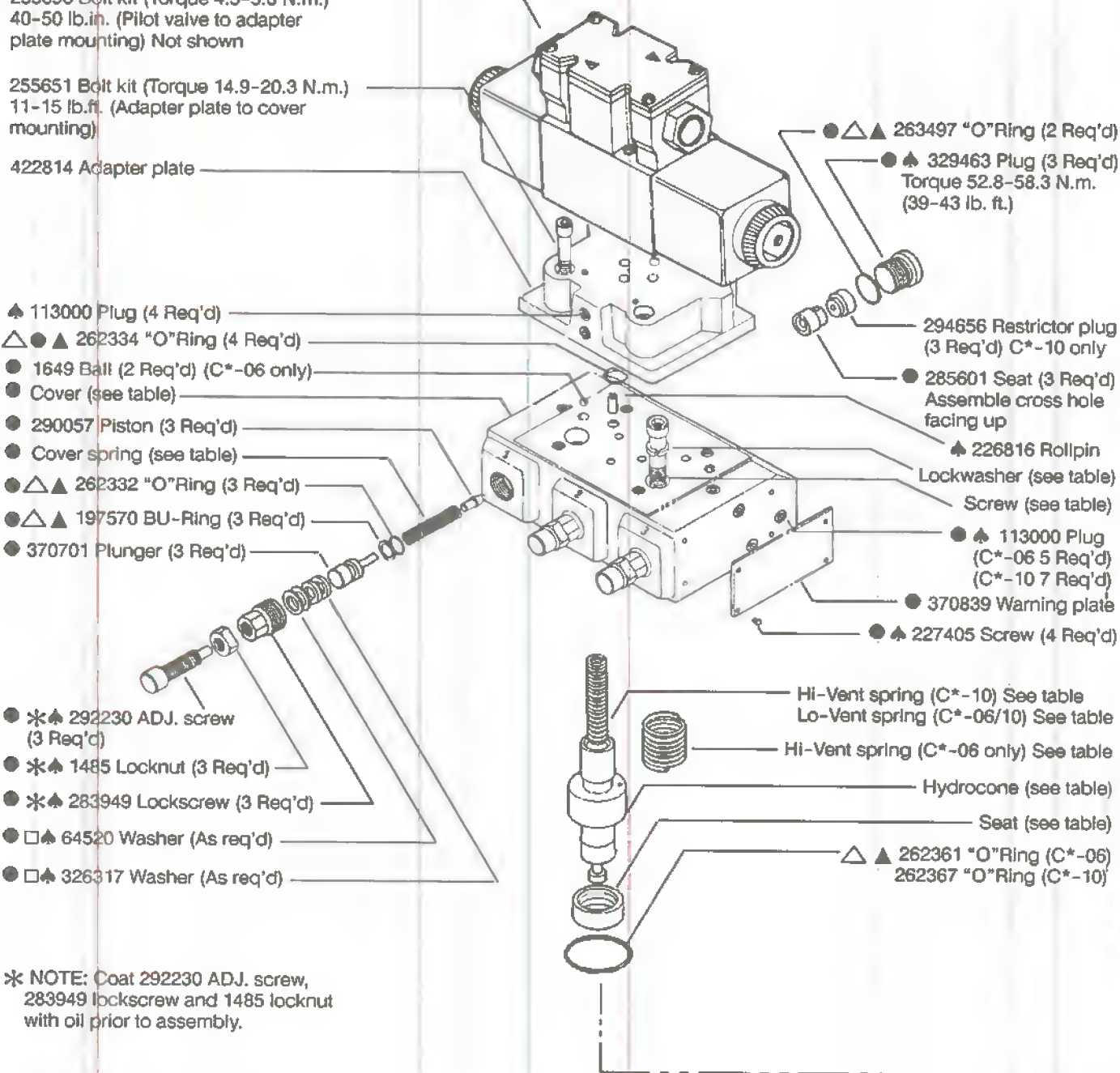
326317 Washer (As req'd)

* **NOTE:** Coat 292230 ADJ. screw, 283949 lockscrew and 1485 locknut with oil prior to assembly.

□ **NOTE:** These parts used at final test to obtain correct pressure range.

WARNING

Use only a DG4V3(S)-8C-60 directional valve as a pilot for this relief valve. Use of a different pilot can block relief valve, causing excessive system pressure.



NOTE:

For satisfactory service life of these components in industrial applications, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. OFP, OFR, and OFRS series filters are recommended.

Model	Seat	Hydrocone	Lo-Vent spring	Hi-Vent spring	Cover
C*-06	343153	343154	2077	184458	370664
C*-10	283954	283952	291822	291821	370669

NOTE: Use either a Lo-Vent or Hi-Vent spring. Do not use both. (See model code)

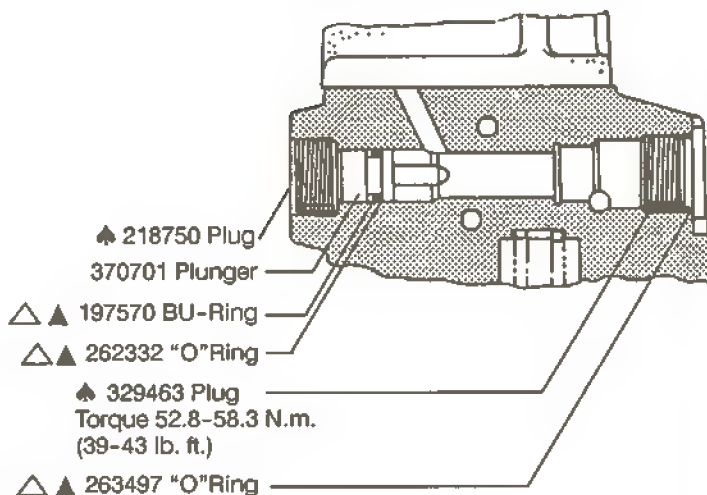
Model	Screw (4 Req'd)	Torque		Lock washer (4 Req'd)
		lb. ft.	N.m	
C*-06	1036	11-15	14.9-20.3	68907
C*-10	1076	35-43	47.5-58.3	68909

Cover kits for C*-06-*** are available for several spring arrangements

Spring order in head 1 2 3	● Included in kit (-06 only)
-C B F-	● 942198
-C B C-	● 942202
-F F B-	● 942326

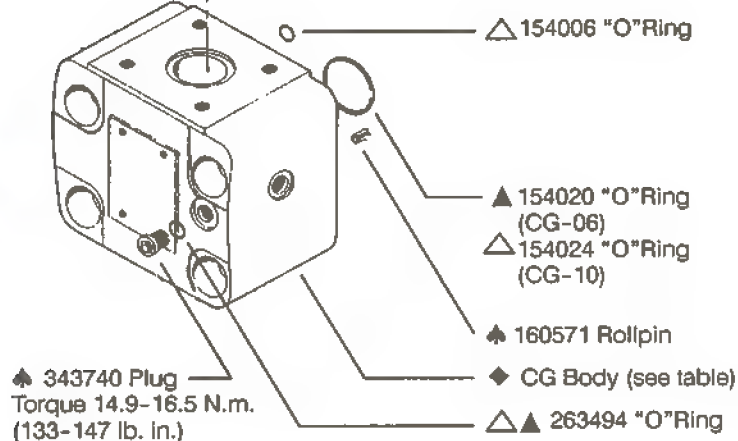
Model	Cover spring	Pressure range psi (bar)
C*-**-B	2280	125-1000 (8.5-70)
C*-**-C	583937	500-2000 (35-140)
C*-**-F	2281	1500-3000 (105-210)

Sectional "E" vent head 1, 2, or 3

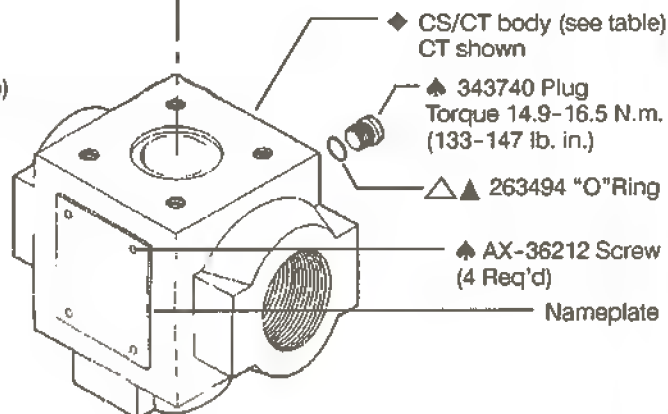


♣ Part	Kit
1485	944064
AX-36212	944053
1649	944067
64520	944068
113000	944055
160571	944069
218750	944070
226816	944071
227405	944074
292230	944072
326317	944073
329463	944041
343740	944038

Parts with ♣ available only in kits of 25.
Reference kit on parts order.



Model	◆ Body	
	-06	-10
CG	580456	581703
CS	581701	580430
CT	590348	590300



- ▲ Included in -06 F3 seal kit 919684
- △ Included in -10 F3 seal kit 919685
- ♣ Available only in kits of 25.
- ◆ Not available for sale

Model Code

(F3)-C*		**-**(*)		(V)	-DG-	**(L)**		-(VM)	-(S*)	-*	-**	-*	*(L)	-**	*	-***	-**	-EN**			
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22

1 Seals for mineral oil & fire resistant fluids

2 Relief valve connections

G - Subplate mounting
S - Straight threads
T - NPTF threads

3 Valve size

06 - 3/4"
10 - 1-1/4"

4 Pressure range

B - 125-1000 psi
C - 500-2000 psi
F - 1500-3000 psi
E - Vent

5 High vent

Blank - Omit for low vent models

6 Directional valve

7 Spool type & spring arrangement

8C - Spring centered, Tri-pressure

8 Left hand build

Omit for standard models

9 Manual override options (included in pilot valve model code)

Blank - Plain override solenoid ends only
H - Waterproof override solenoid ends only
H2 - Waterproof override both ends of single solenoid
M - Serviceable manual overrides in solenoid ends only
P2 - Plain override both ends of single solenoid
Y - Lockable manual overrides solenoid ends only
Z - No overrides in either end

10 Solenoid energization identity

Blank - Standard arrangement for ANSI B93.9 (energise solenoid A for flow P to A port)

V - Solenoid Identification determined by position of solenoid. (Solenoid A at port A end and/or solenoid B at port B end. (All 4 & 8 spools are always V code)

11 Flag symbol heading electrical options & features

12 Spool position monitoring switch (tank pressure rating 10 bar only)

S1 - Switch, normally open, U coils only
S2 - Switch, normally closed, U coils only
S3 - Switch, wired normally open, P*
S4 - Switch, wired normally closed, P*
S5 - Switch, free leads, FW & FJ only
Omit if not required

13 Coil type

U - ISO 4400
P - Plug in coil
F - Flying lead
SP1 - Single 6,3 series spade to IEC 760
SP2 - Dual 6,3 series spade to IEC 760

14 Electrical connections (F type coil only) omit if not required

T - Wired terminal block
PA - Instaplug male receptacle only
PB - Instaplug male & female receptacle
PA3 - Three pin connector & terminal block
PA5 - Five pin connector & terminal block

15 Housing (F type coils only)

W - 1/2 NPT thread wiring housing
J - 20 mm thread wiring housing

16 Electrical options

1 - ISO with fitted plug, U type coils only
7 - Surge damper, P type coils only
9 - Rectifier (fast type) P type coils only
12 - Rectifier (slow type) P type coils only

17 Solenoid Indicator lights (F build only) To be used with T terminal block models. (Omit if not required)

18 Coil identification

19 Pilot valve code (tank pressure rating)

2 - 10 bar (145 psi) use with switch models S*
5 - 100 bar (1450 psi) for all other models

20 Pilot valve port orifices

21 Design

40 - DG4V3S-60
Standard pilot valve
50 - DG4V3-60
High performance pilot valve

22 Special modifications (omit if not required)

7 Thru **20** Included in pilot valve model code

VICKERS

Service Parts Information

DG17V-3-**(L)-60 Lever operated CETOP 3 directional control valve

Spool Type	Model		
	A	C	N
0	893032	893025	893025
2	893033	893026	893026
6	893034	893027	893027
7		893028	893028
8		893029	
22	893035		
33		893030	893030

Assemble "A" type spools in body with longer end land opposite operator.

NOTE

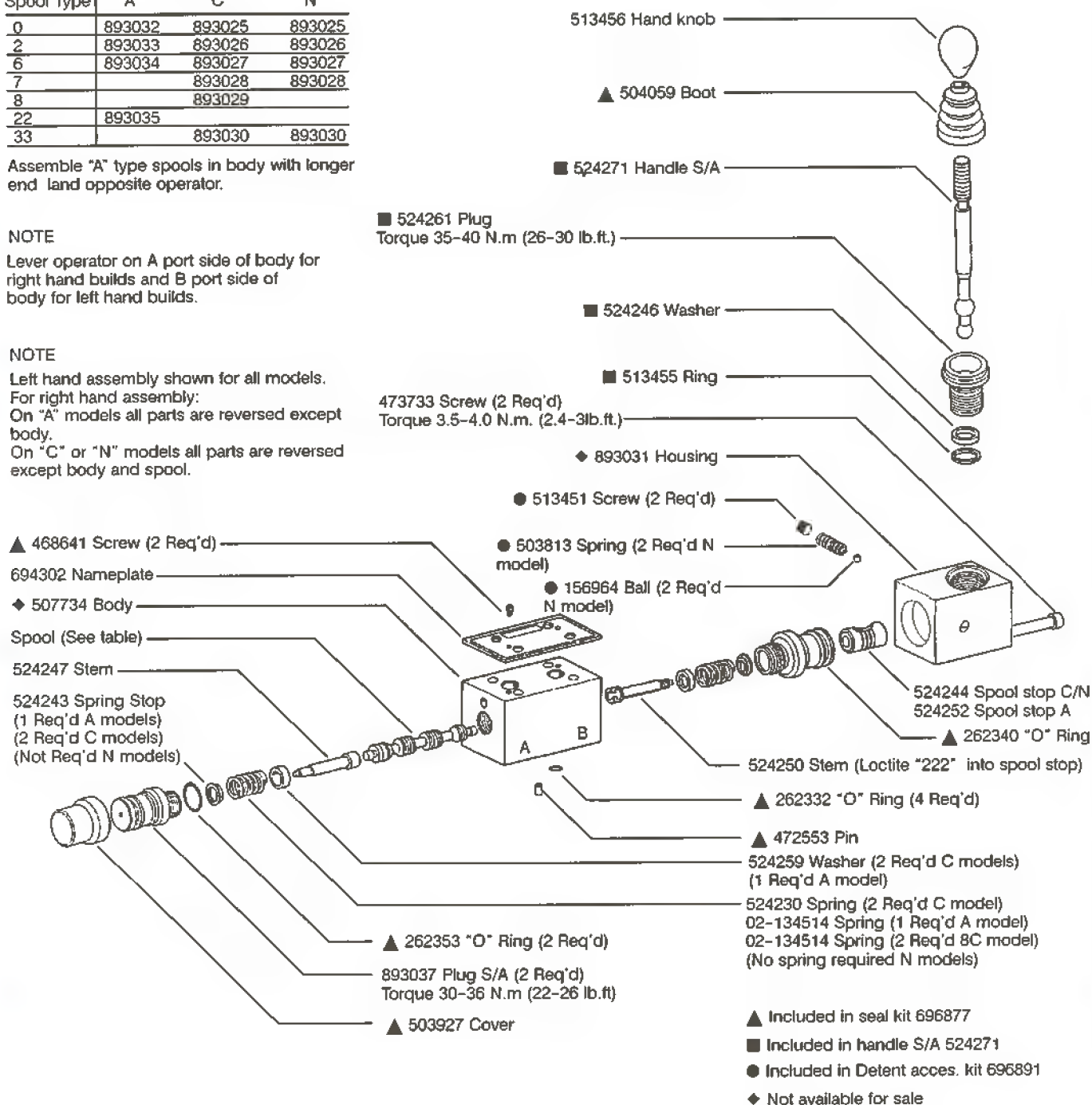
Lever operator on A port side of body for right hand builds and B port side of body for left hand builds.

NOTE

Left hand assembly shown for all models.
For right hand assembly:
On "A" models all parts are reversed except body.
On "C" or "N" models all parts are reversed except body and spool.

NOTE

Grease handle, socket & hole in stop prior to assembly.



Model Code

DG	17	V	-	3	-	*	*	(L)	-	60
1	2	3		4	5	6	7			8

1 D - Directional control valve
G - Subplate mounting

2 Lever operated

3 Rated pressure

V - 350 bar (5075 psi)

4 Interface

3 - ISO 4401-03 (CETOP 3 & NFPA D03)

5 Spool type (see table)

6 Spool/Spring arrangement

A - Spring offset, to cylinder "A"

C - Spring centered

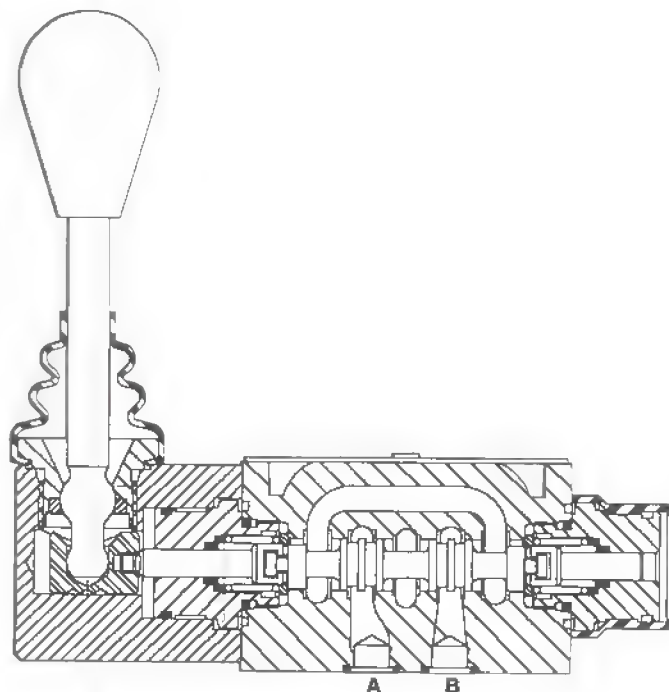
N - No spring detented

7 Build type

L - Left hand build (lever on "B" port side of valve)

Omit - Right hand build (lever on "A" port side of valve)

8 Design



Typical sectional view

VICKERS

A TRIMETAL Company

Vickers Incorporated
5445 Corporate Drive
P. O. Box 302
Troy, Michigan 48007-0302
U.S.A.

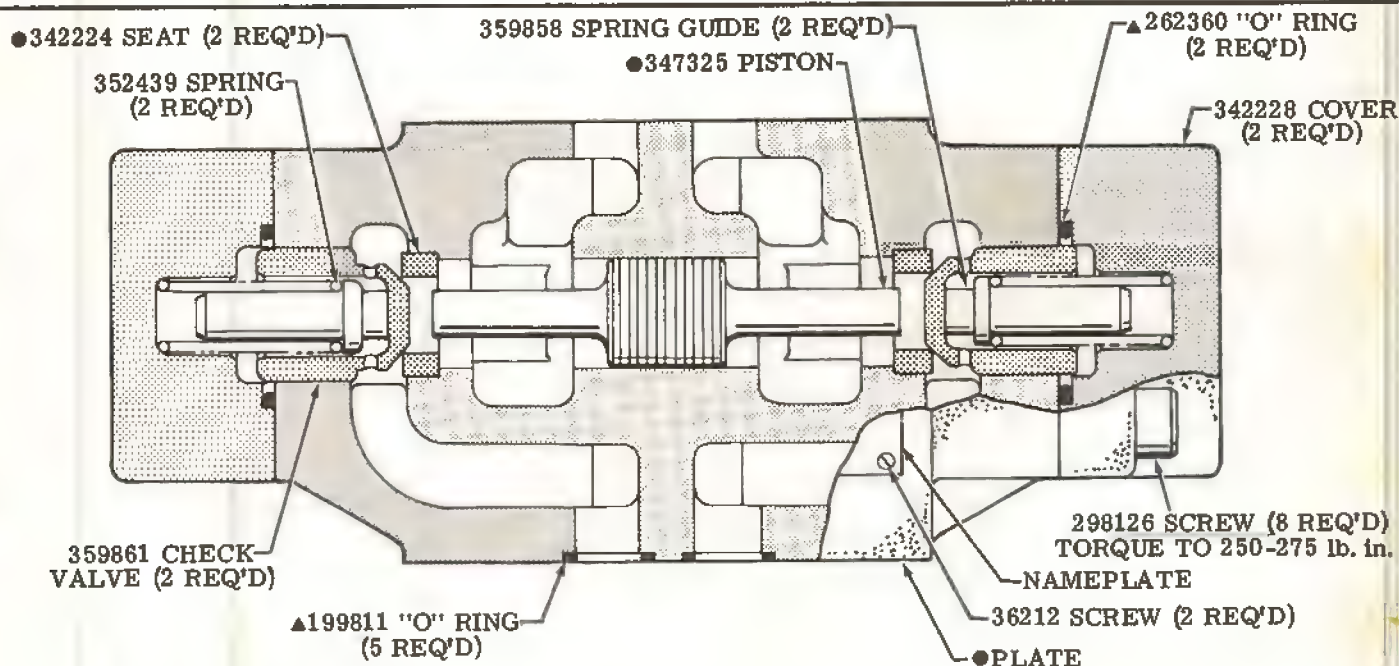
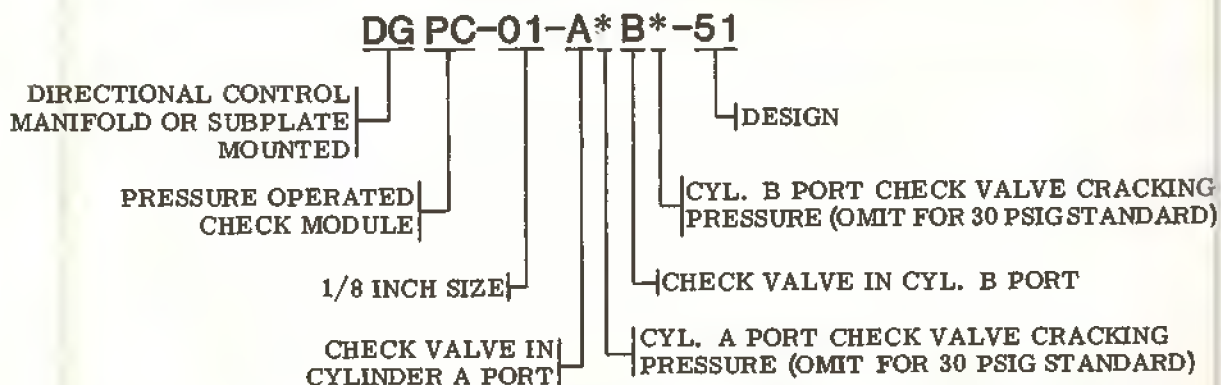
**PRESSURE
OPERATED
CHECK VALVES**

Service Parts Information

DGPC-01-A*B*-51

DGPC-06-A*B*-51

MODEL CODE BREAKDOWN



CAUTION
THIS VALVE CANNOT BE USED WITH PRESSURE CENTERED OR DG-18 AIR OPERATED VALVES.

NOTE
REFER TO INSTALLATION DRAWING 522650 FOR BOLT KIT INFORMATION AND MODULE STACKING DATA. THE MOUNTING BOLT TORQUE SHOULD NOT EXCEED A MAXIMUM OF 112 lb. in. SUBPLATE INFORMATION IS TABULATED ON PARTS DRAWING I-3381-S.

● INCLUDED IN
347456 BODY S/A

▲ INCLUDED IN F3
SEAL KIT 920215

MODEL CODE BREAKDOWN

DG PC-06-A*B*-51

DIRECTIONAL CONTROL
MANIFOLD OR SUBPLATE
MOUNTED

DESIGN

PRESSURE OPERATED
CHECK MODULE

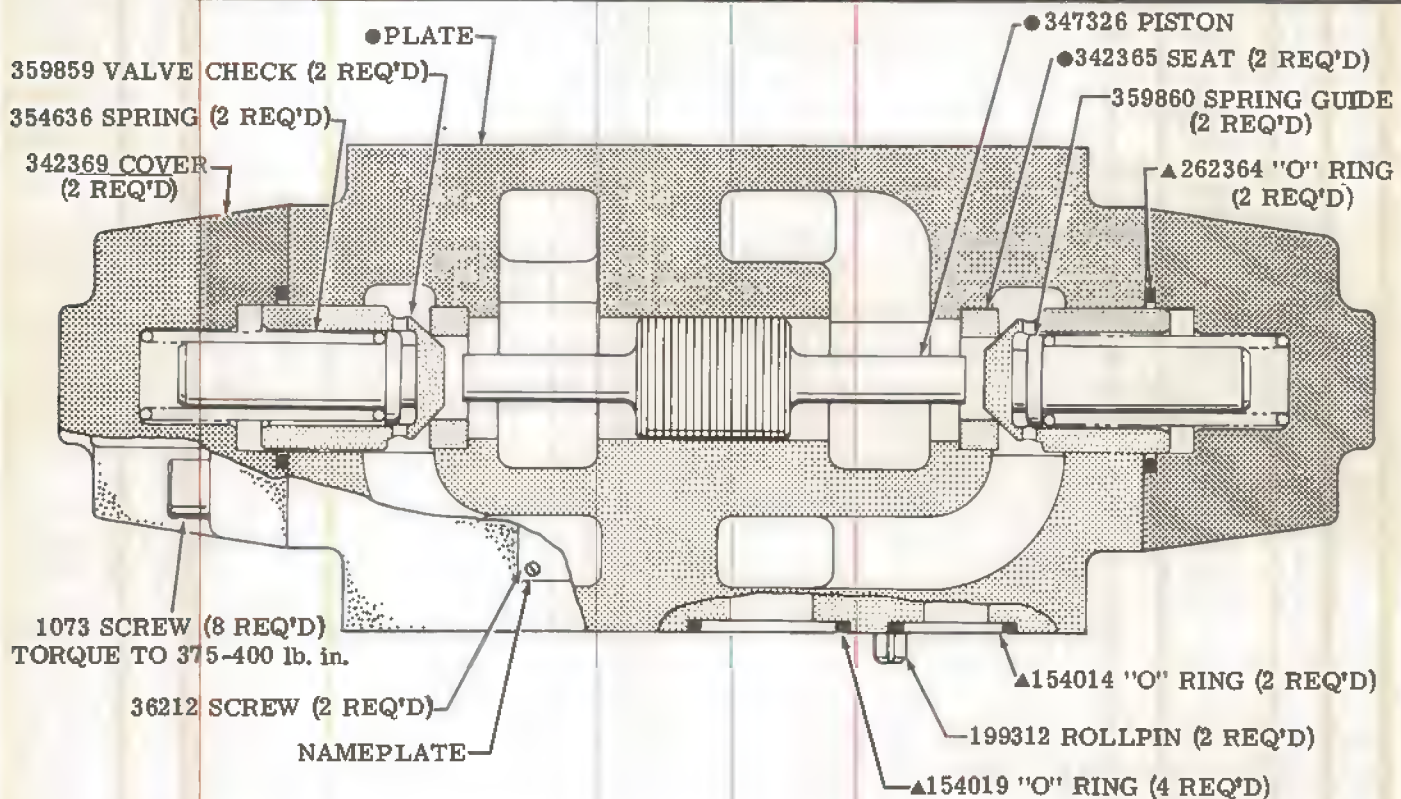
CYL. B PORT CHECK VALVE CRACKING
PRESSURE (OMIT FOR 30 PSIG STANDARD)

3/4 INCH SIZE

CHECK VALVE IN CYL. B PORT

CHECK VALVE IN CYL. A PORT

CYL. A PORT CHECK VALVE CRACKING
PRESSURE (OMIT FOR 30 PSIG STANDARD)



CAUTION

THIS VALVE CANNOT BE USED WITH PRESSURE CENT-
ERED OR DG-18 AIR OPERATED VALVES.

NOTE

REFER TO INSTALLATION DRAWING 522650 FOR BOLT
KIT INFORMATION AND MODULE STACKING DATA. THE
MOUNTING BOLT TORQUE SHOULD NOT EXCEED A
MAXIMUM OF 700 lb. in. SUBPLATE INFORMATION IS
TABULATED ON PARTS DRAWING I-3381-S.

▲ INCLUDED IN F3
SEAL KIT 920216

● INCLUDED IN
349164 BODY S/A

Litho in U. S. A.

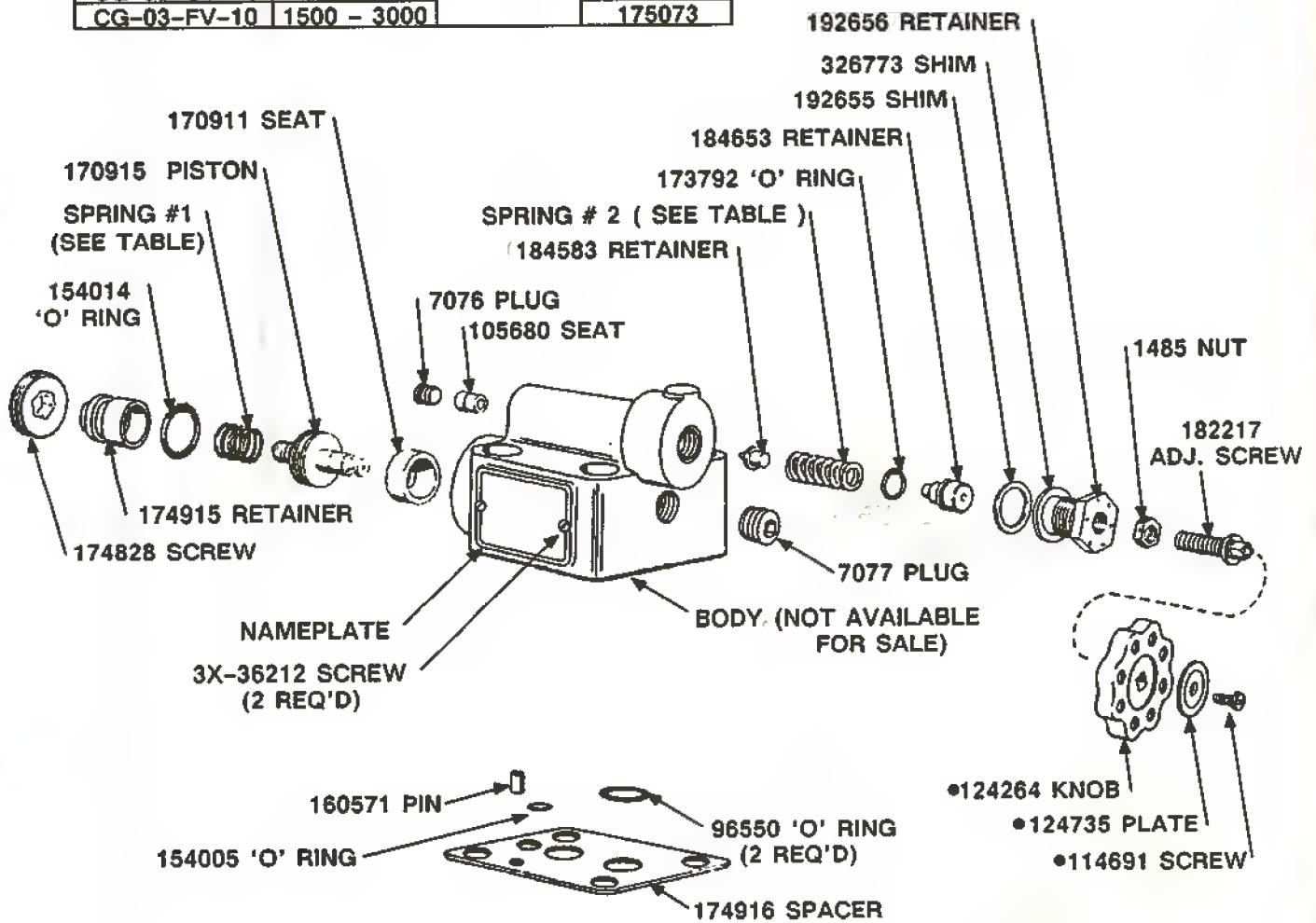
Service Parts Information

HIGH PRESSURE
RELIEF VALVES

CG-03-**-10



MODEL	PRESSURE RANGE	SPRING #1	SPRING #2
CG-03-B-10	90 - 1000	175070	175071
CG-03-C-10	500 - 2000		175072
CG-03-F-10	1500 - 3000		175073
CG-03-BV-10	75 - 1000	184458	175071
CG-03-CV-10	500 - 2000		175072
CG-03-FV-10	1500 - 3000		175073



• Models with handwheel controls are available. Specify in model number by adding suffix -S81. Example: CG-03-**-10-S81

MODEL CODE BREAKDOWN

C G 03 B (V) 10
1 2 3 4 5 6

1 RELIEF VALVE

4 PRESSURE RANGE

B - 75 - 1000 PSI
C - 500 - 2000 PSI
F - 1500 - 3000 PSI

2 MOUNTING TYPE

G - Manifold or Subplate

5 HIGH VENT SPRING

Omit if not required

3 VALVE SIZE

03 - 3/8" Nominal Size

6 DESIGN

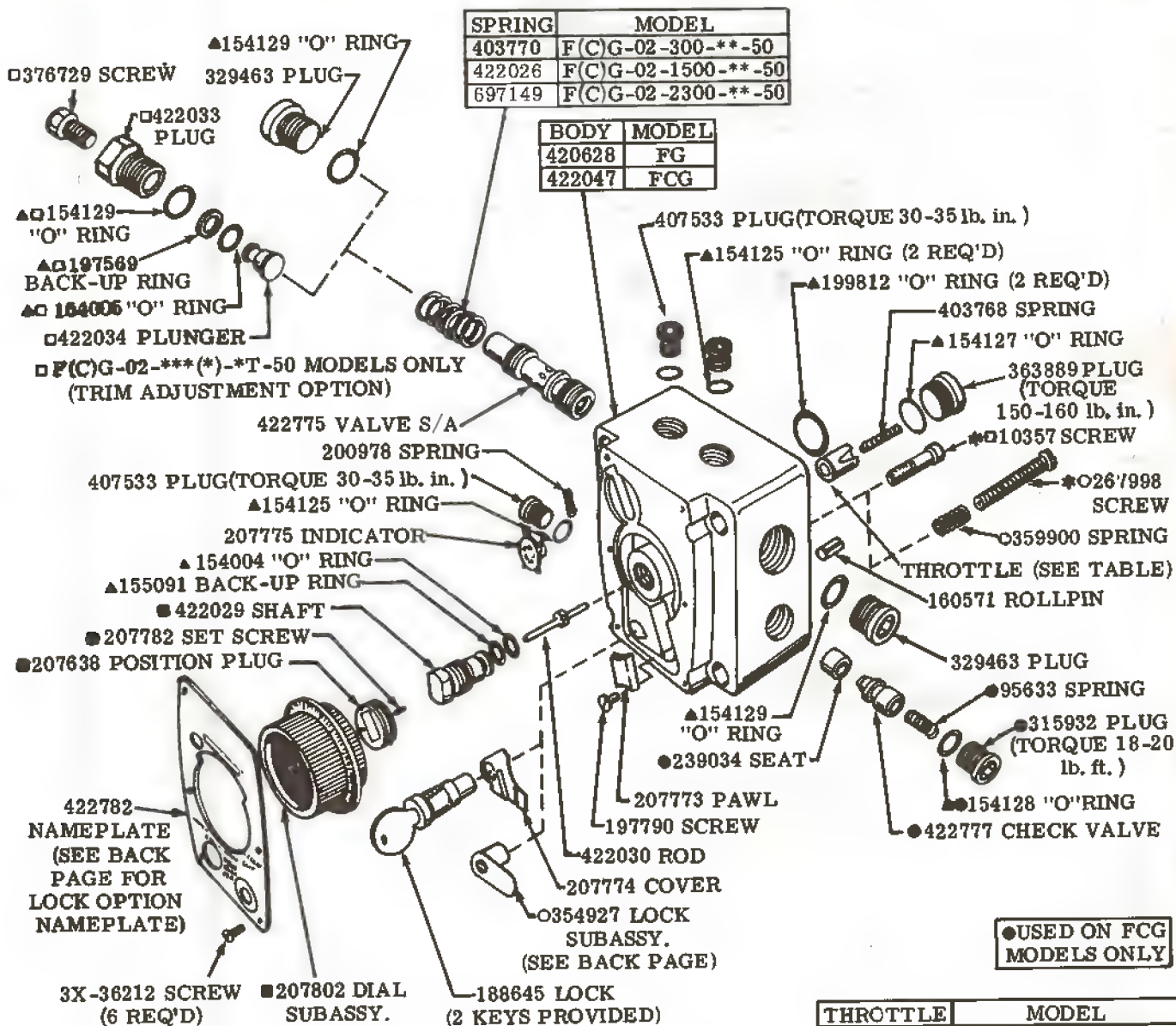
For satisfactory service life of these components, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from OFP, OFR and OFRS filter series are recommended.

Litho in U.S.A.

Service Parts Information

FLOW CONTROL VALVES

F(C)G-02-300-**-50
F(C)G-02-1500-**-50
F(C)G-02-2300-**-50



SPRING	MODEL
403770	F(C)G-02-300-**-50
422026	F(C)G-02-1500-**-50
697149	F(C)G-02-2300-**-50

BODY	MODEL
420628	FG
422047	FCG

●USED ON FCG MODELS ONLY

THROTTLE	MODEL
422027	F(C)G-02-300-**-50
422028	F(C)G-02-1500-**-50
853593	F(C)G-02-2300-**-50

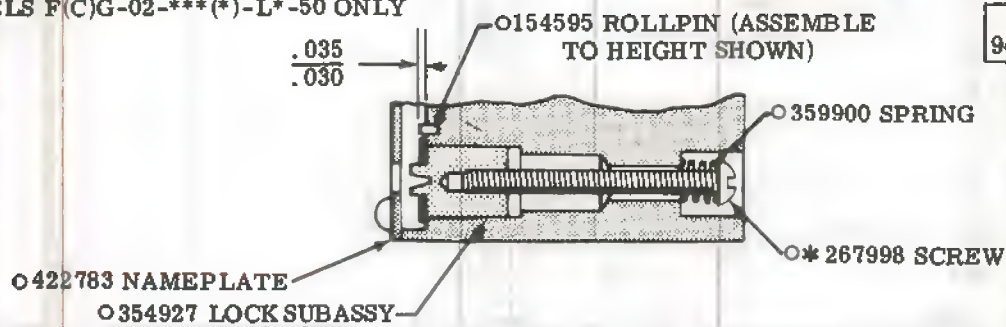
■WITH 422029 CONTROL SHAFT SCREWED FULLY IN, ADJUST 207638 POSITIONING PLUG IN 207802 DIAL SO THAT "O" ON DIAL LINES UP WITH POINTER ON NAMEPLATE WHEN DIAL IS ASSEMBLED ON SHAFT. LOCK SECURELY WITH 207782 SET SCREW.

▲INCLUDED IN 920037 SEAL KIT

F3 EQUIVALENT SEAL KIT 920103

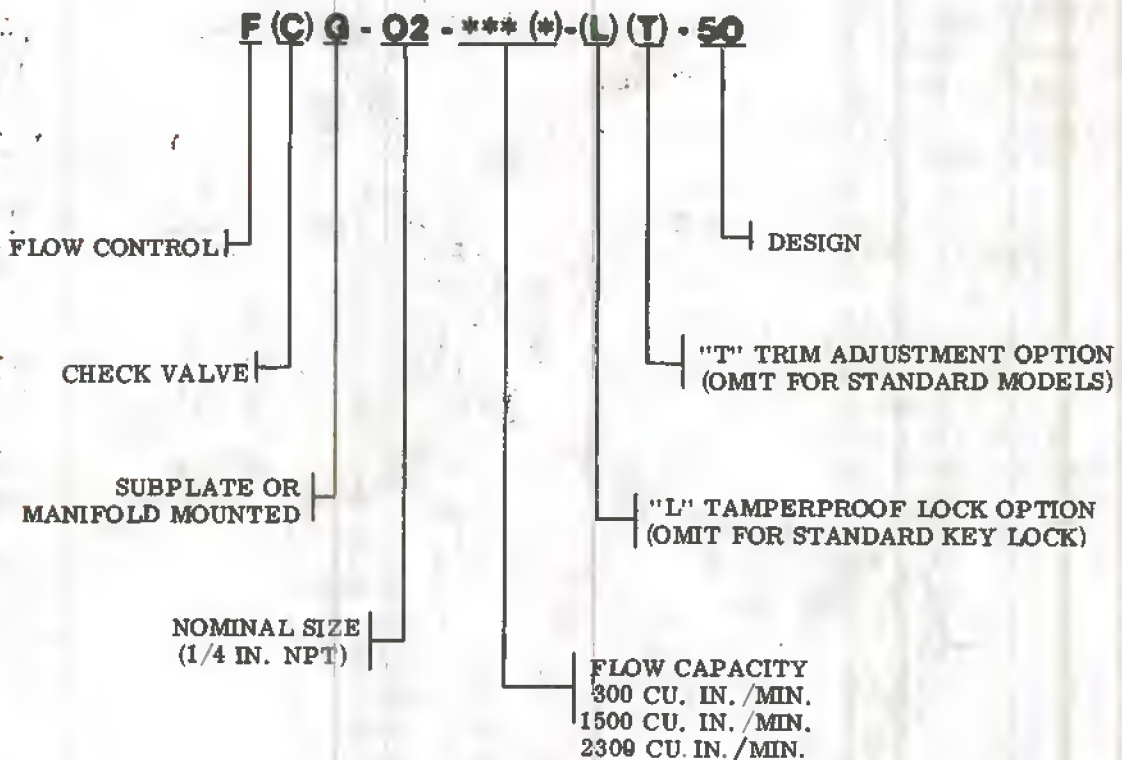
* COAT THREADS WITH LOCTITE SEALANT. TIGHTEN TO LOCKING POSITION THEN BACK OFF 1/4 TURN.

TAMPERPROOF LOCK OPTION
MODELS F(C)G-02-***(*)-L*-50 ONLY



○ INCLUDED IN
942085 LOCK KIT

MODEL CODE BREAKDOWN



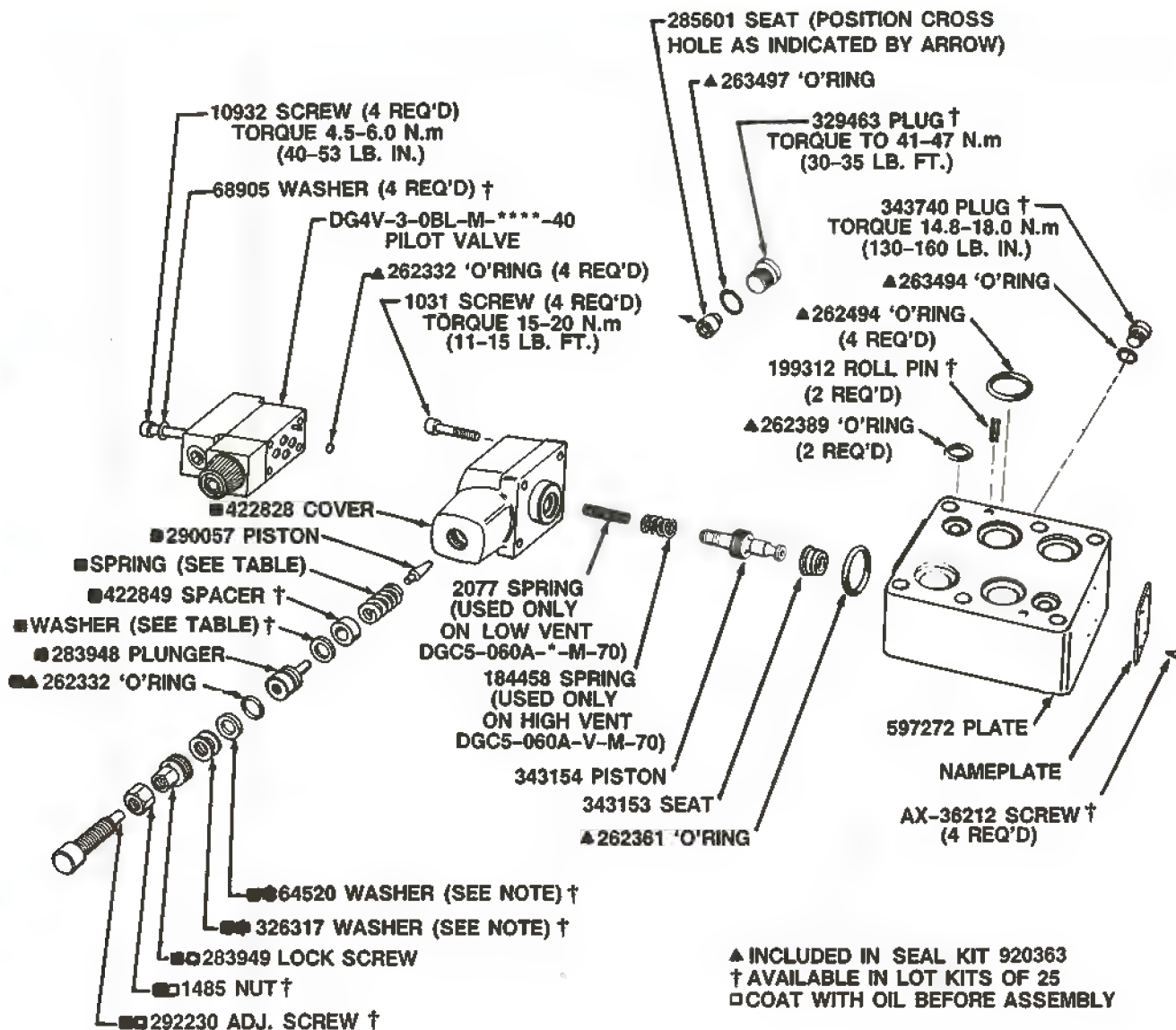
For satisfactory service life of these components, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from OFF, OFR and OFRS filter series are recommended.

Litho in U.S.A.

Service Parts Information

SOLENOID CONTROLLED RELIEF VALVE MODULE

(F3)-DGC5-060A(P)-*(V)-M(P**)-**-*-70



MODEL	■ INCLUDED IN COVER S/A	SPRING	WASHER
DGC5-060A-B-*-M-70	926570	2280	OMIT
DGC5-060A-C-*-M-70	926571	583937	233110
DGC5-060A-F-*-M-70	926572	2281	OMIT

***NOTE**
USE AS REQUIRED TO OBTAIN
PROPER ADJUSTMENT RANGE.

REFER TO I-3862-S FOR PILOT
VALVE PARTS BREAKDOWN

MODEL CODE BREAKDOWN

(F3) - DGC5 06 0A (P) - * (V) - M (P**) - ** - * - 70

1
2
3
4
5
6
7
8
9
10
11
12

1	Mineral Oil & Fire Resistant Seals	7	High Vent Option (Omit if not required)
2	Solenoid Controlled Relief Valve Module	8	Flag Symbol Heading for Electrical Features & Options at Pilot Valve
3	Valve Size (3/4 Inch)	9	Electrical Features (Refer to drawing I-3866-S)
4	Pilot Valve Spool Type & Function	10	Electrical Connector Options U - DIN 43650 W - 1/2" NPT WL - 1/2" NPT with Solenoid Indicator Light
5	Manual Override in Pilot Valve (Omit if not required)	11	Coil Voltage I.D. Letter Code (Refer to drawing I-3866-S)
6	Pressure Range B - 125-1000 PSI C - 500-2000 PSI F - 1500-3000 PSI	12	Design Number

† AVAILABLE IN LOT KITS OF 25

ITEM	LOT KIT	ITEM	LOT KIT
1485 NUT	944064	292230 SCREW	944072
36212 SCREW	944053	233110 WASHER	944076
64520 WASHER	944068	326317 WASHER	944073
68905 WASHER	944077	329463 PLUG	944041
199312 PIN	944059	343740 PLUG	944038
		422849 SPACER	944075

For satisfactory service life of these components, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from Vickers OFF, OFR and OFRS filter series are recommended.

**SPRING
CENTERED
DIRECTIONAL
VALVES**

Service Parts Information

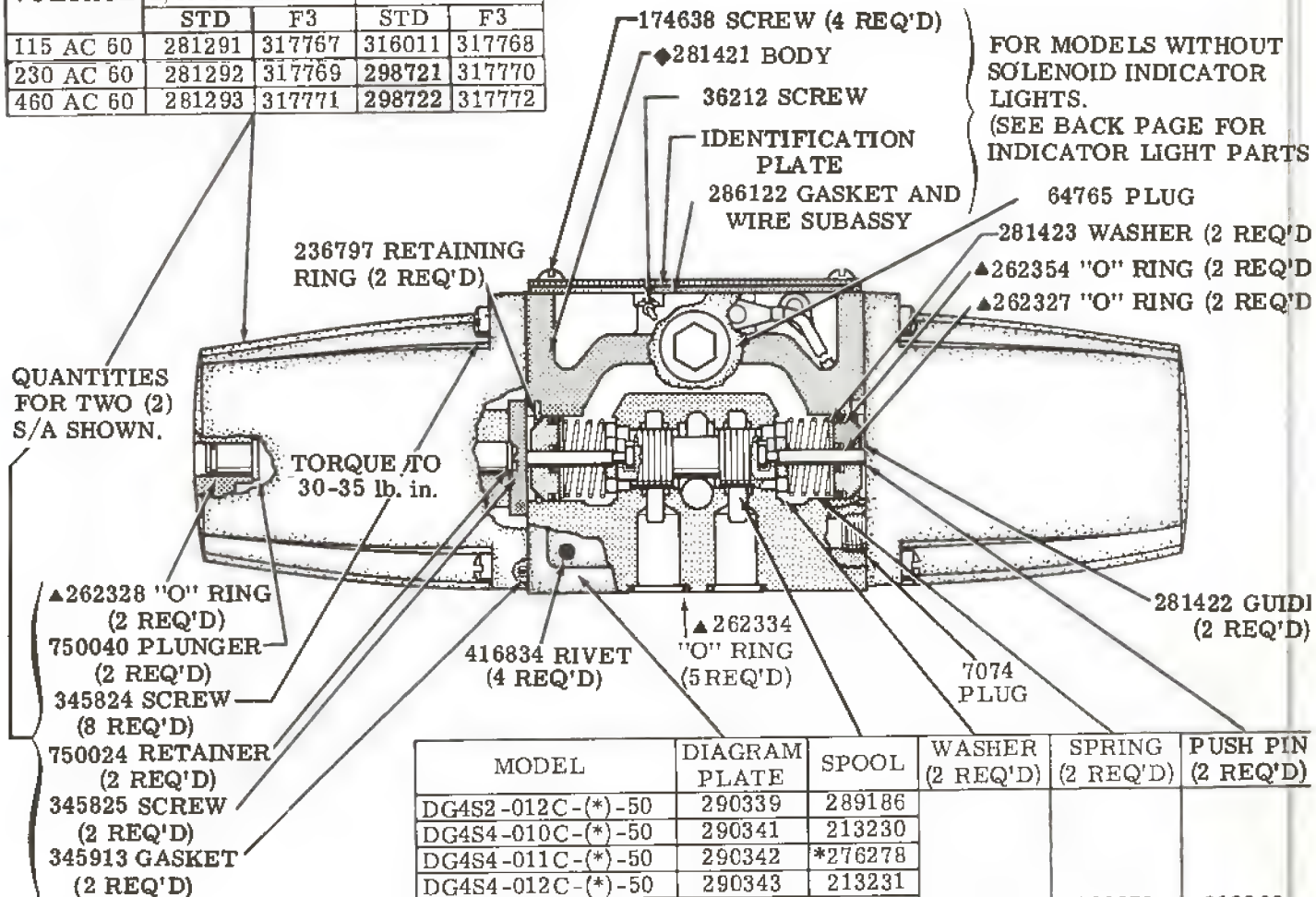
DG4S2-012C-(*)-50

DG4S4-01*(*)C-(*)-50

NOTE
FOR 50/60 CYCLE SOLENOIDS
SEE BACK PAGE

FOR ADDITIONAL
SOLENOID S/A'S
SEE I-3544-S.

VOLTAGE	SOLENOID S/A (2 REQ'D)			
	S/A COMPLETE		COIL	
	STD	F3	STD	F3
115 AC 60	281291	317767	316011	317768
230 AC 60	281292	317769	298721	317770
460 AC 60	281293	317771	298722	317772



▲INCLUDED IN
919214 SEAL KIT

◆NOT AVAILABLE
FOR SALE

MODEL	DIAGRAM PLATE	SPOOL	WASHER (2 REQ'D)	SPRING (2 REQ'D)	PUSH PIN (2 REQ'D)
DG4S2-012C-(*)-50	290339	289186	211846	290072	213268
DG4S4-010C-(*)-50	290341	213230			
DG4S4-011C-(*)-50	290342	*276278			
DG4S4-012C-(*)-50	290343	213231			
DG4S4-013C-(*)-50	290344	*239903			
DG4S4-016C-(*)-50	290345	213232			
DG4S4-0168C-(*)-50	577480	213232			
DG4S4-017C-(*)-50	290346	236624	211846	290072	213268
DG4S4-0178C-(*)-50	577482	236624			
DG4S4-018C-(*)-50	290340	235637			
DG4S4-0133C-(*)-50	577484	236615	211846	290072	213268

* ASSEMBLE RELIEVED LAND OF TYPE 1 & NARROW LAND OF TYPE 3 SPOOLS TOWARD "A" PORT.

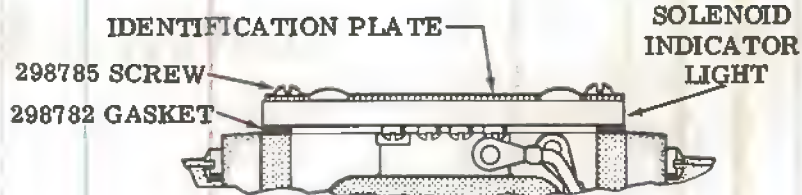
□ ASSEMBLE ON SPOOL WITH SHARP BREAK EDGE TOWARD SPRING.

**SOLENOID INDICATOR LIGHT KIT
(INCLUDES ALL PARTS IDENTIFIED)**

VOLTAGE RANGE	KIT
100 thru 125	941615

NOTE
REFER TO PARTS DRAWING
I-3487-S FOR MODELS WITH
PLUG-IN FEATURE.

**FOR MODELS WITH
SOLENOID INDICATOR LIGHTS**



50/60 HERTZ SOLENOIDS		
MODEL	SOLENOID S/A (2 REQ'D)	COIL
DG*S4-***-115AC-50/60-5*	751137	751057
F3-DG*S4-***-115AC-50/60-5*	751407	751406

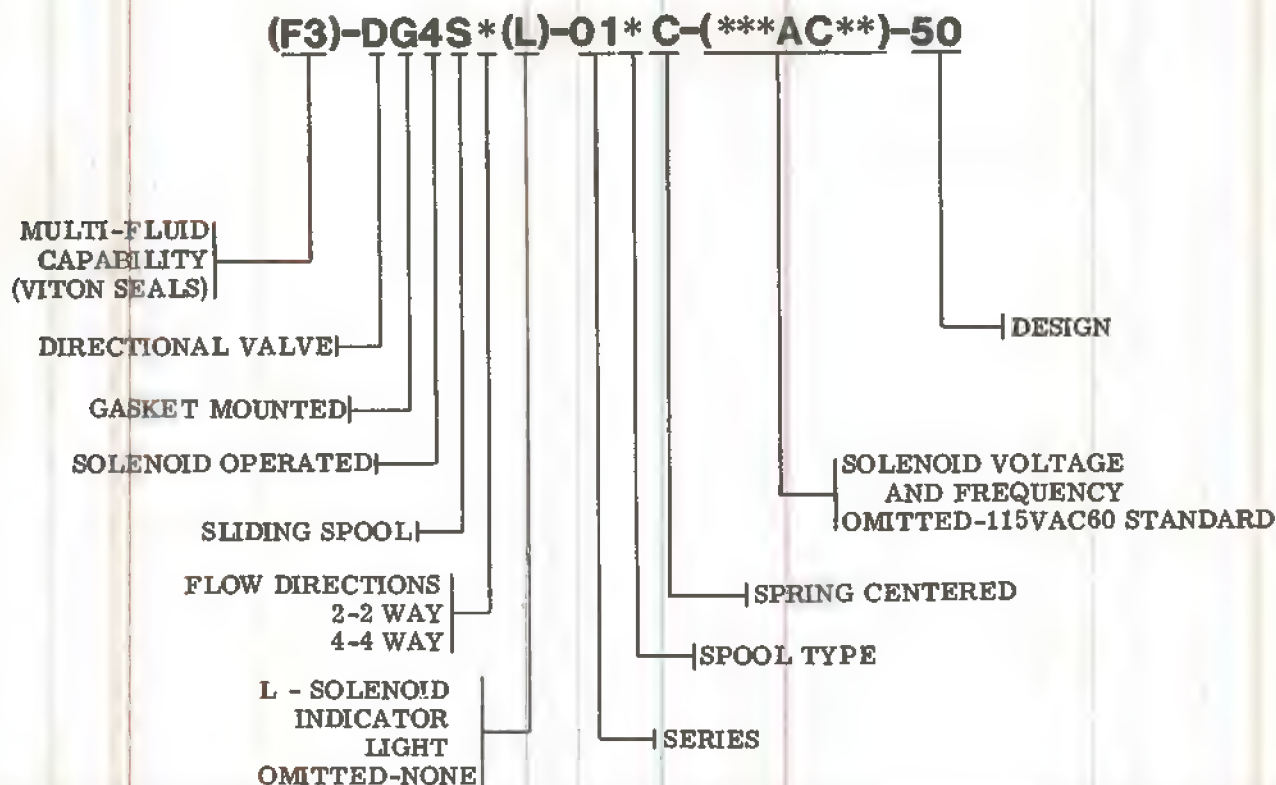
LEAD WIRE IDENTIFICATION

RED LEAD - COMMON
YELLOW LEAD - 60 Hz
BLUE LEAD - 50 Hz

CAUTION

FOR 50 CYCLE OPERATION USE RED AND BLUE LEADS
FOR 60 CYCLE OPERATION USE RED AND YELLOW LEADS
DO NOT USE BLUE AND YELLOW LEADS TOGETHER

MODEL CODE BREAKDOWN



For satisfactory service life of these components in industrial applications, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from Vickers OFF, OFR, and OFRS series are recommended.

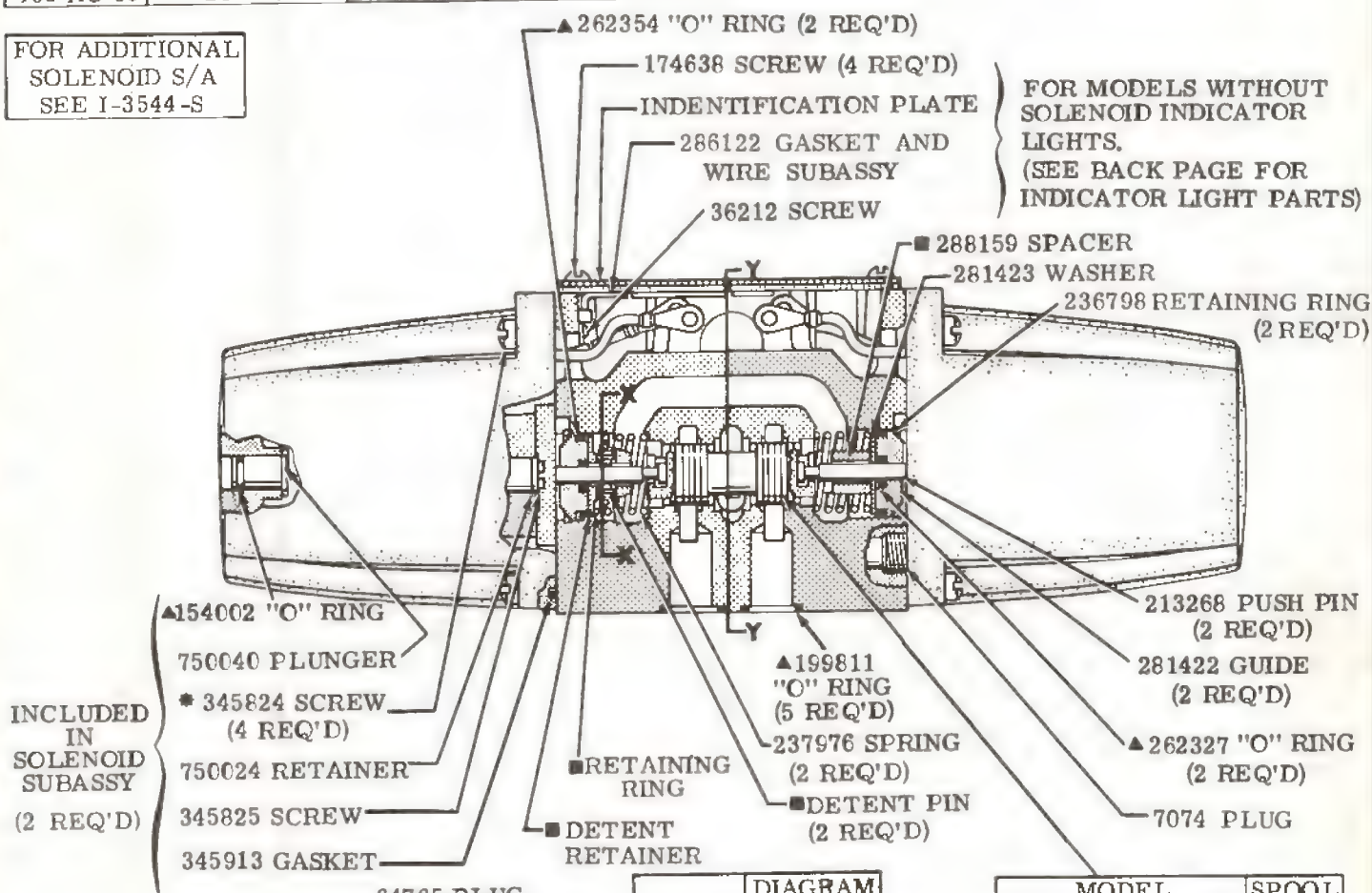
NO-SPRING DETENTED SOLENOID CONTROLLED DIRECTIONAL VALVES

Service Parts Information

DG4S*(L)-01*N-(***AC)*-51

VOLTAGE	SOLENOID S/A	COIL S/A	SOLENOID S/A F3	COIL S/A F3
115 AC 60	281291	316011	317767	317768
230 AC 60	281292	298721	317769	317770
460 AC 60	281293	298722	317771	317772

FOR ADDITIONAL
SOLENOID S/A
SEE I-3544-S

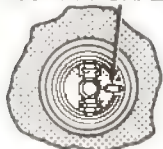


INCLUDED
IN
SOLENOID
SUBASSY
(2 REQ'D)

*TORQUE TO
30 - 35 lb. in.

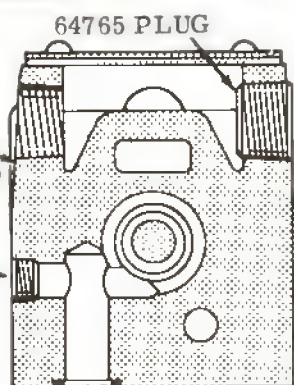
281421 BODY (NOT
AVAILABLE FOR SALE)

157477 ROLL PIN



SECTION X-X

7074
PLUG



SECTION Y-Y

MODEL	DIAGRAM PLATE
DG4S2-	577485
DG4S4-	577486

416834 RIVET
(4 REQ'D)

INCLUDED IN
942132, 51 DESIGN
DETENT S A

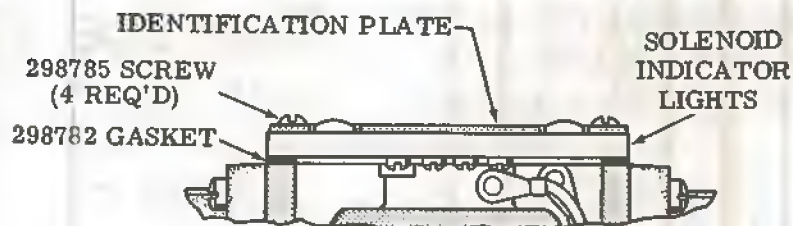
MODEL	SPOOL
DG4S2(L)-012N-51	289186
DG4S4(L)-010N-51	213230
DG4S4(L)-012N-51	213231
DG4S4(L)-016N-51	213232
DG4S4(L)-017N-51	236624
DG4S4(L)-0133N-51	236615

INCLUDED IN
F3 SEAL KIT 919214

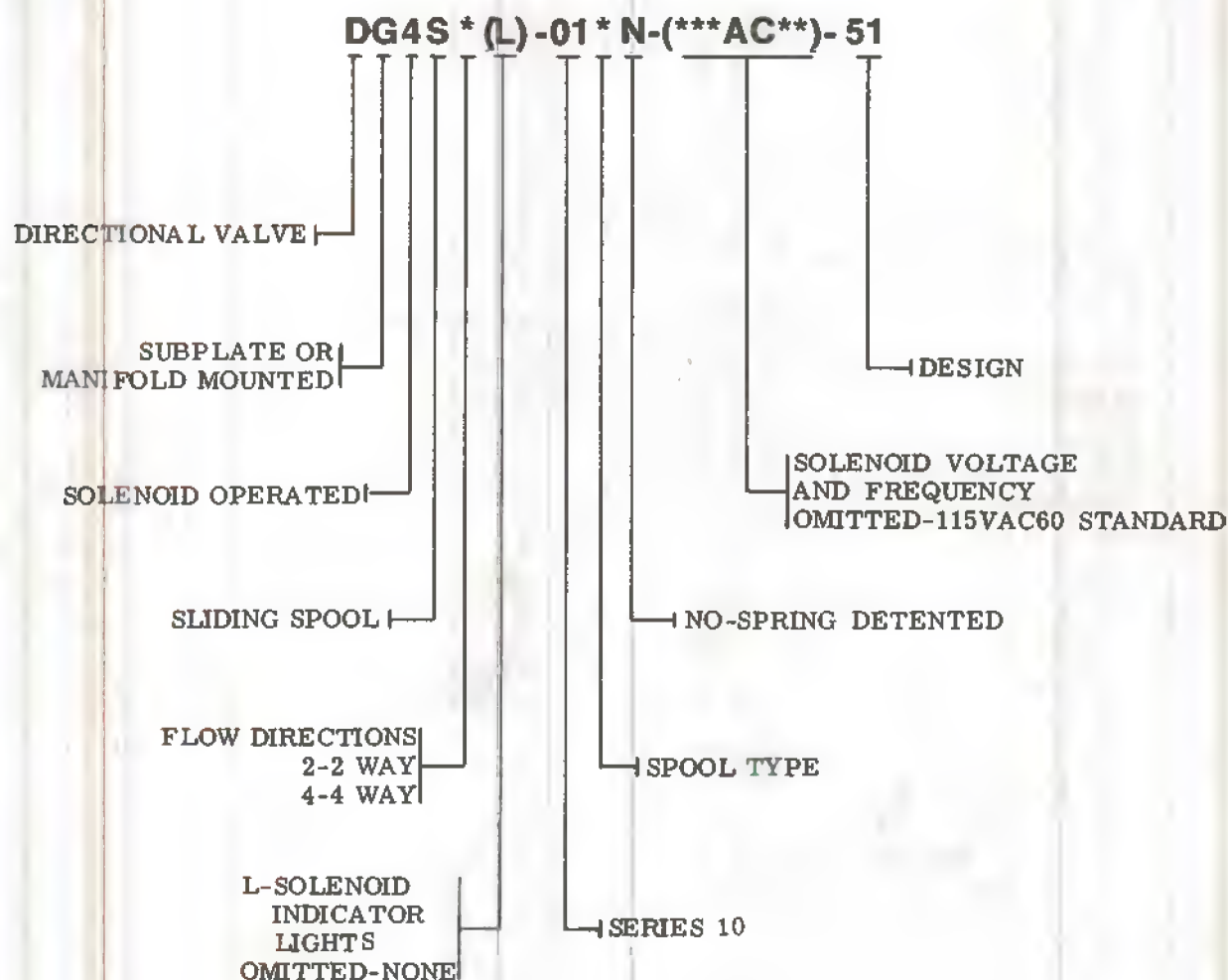
**SOLENOID INDICATOR LIGHT KIT
(INCLUDES ALL PARTS IDENTIFIED)**

VOLTAGE RANGE	KIT
100 thru 125	941615

FOR MODELS WITH
SOLENOID INDICATOR LIGHTS



MODEL CODE BREAKDOWN



For satisfactory service life of these components in industrial applications, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from Vickers OFP, OFR, and OFRS series are recommended.

Litho in U. S. A.

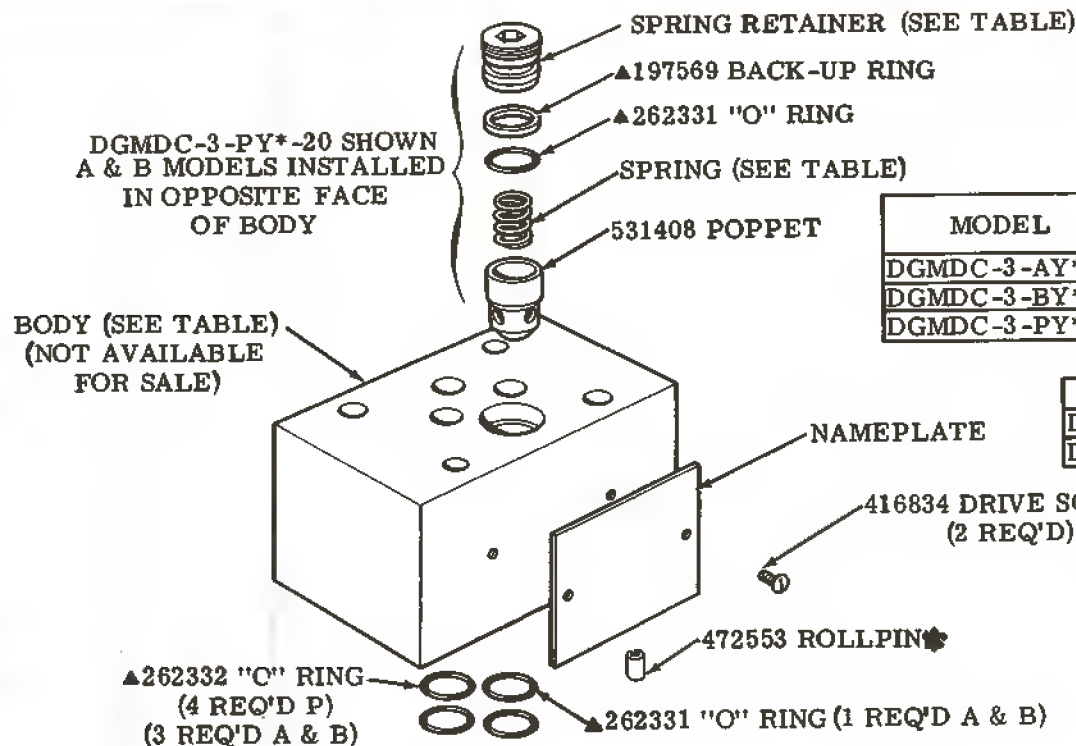
Service Parts Information



DIRECT CHECK VALVE MODULE

DGMDC-3-*X*-20

DGMDC-3-*Y*-20



*AVAILABLE ONLY IN
KITS OF 25 EACH

MODEL	BODY S/A	SPRING RETAINER
DGMDC-3-AY*-20	531692	531492
DGMDC-3-BY*-20	531693	531492
DGMDC-3-PY*-20	531409	531406

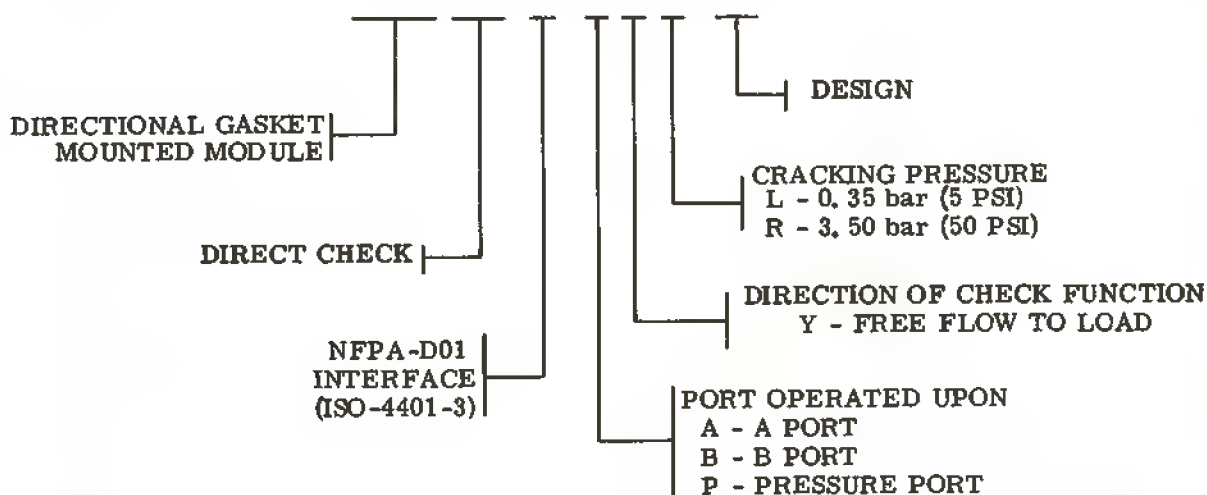
MODEL	SPRING
DGMDC-3-*YL-20	531404
DGMDC-3-*YR-20	531405

NOTE: THIS UNIT IS
OF METRIC DESIGN

▲INCLUDED IN F3
SEAL KIT 920107

MODEL CODE BREAKDOWN

DGM DC - 3 - * Y * - 20



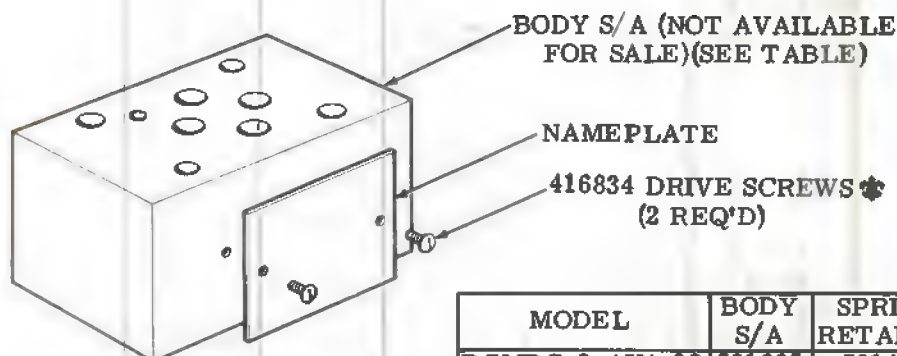
For satisfactory service life of these components in industrial applications, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from Vickers OFP, OFR, and OFRS series are recommended.

Vickers, Incorporated
1401 Crooks Road
Troy, Michigan 48084

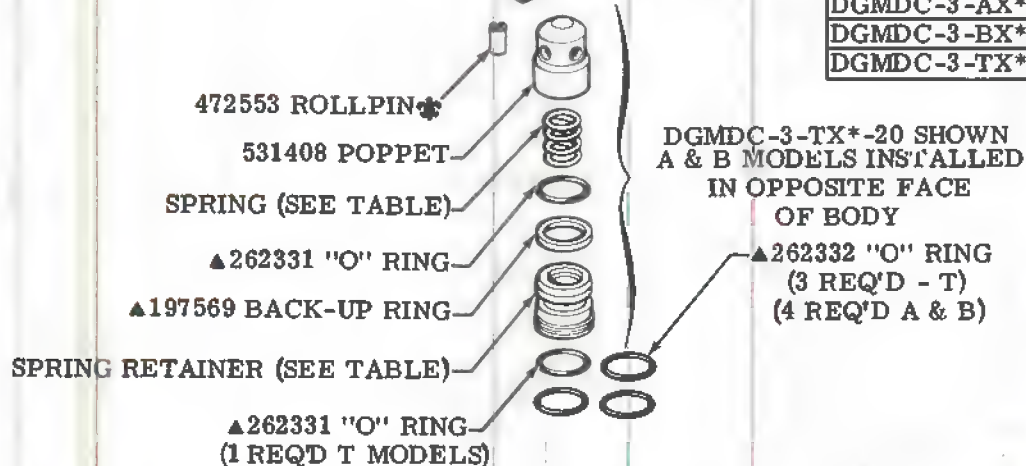
Revised 1-1-88

I-3433-S

MODEL	SPRING
DGMDC-3-*XL-20	531404
DGMDC-3-*XR-20	531405



MODEL	BODY S/A	SPRING RETAINER
DGMDC-3-AX*-20	531695	531406
DGMDC-3-BX*-20	531696	531406
DGMDC-3-TX*-20	531493	531492



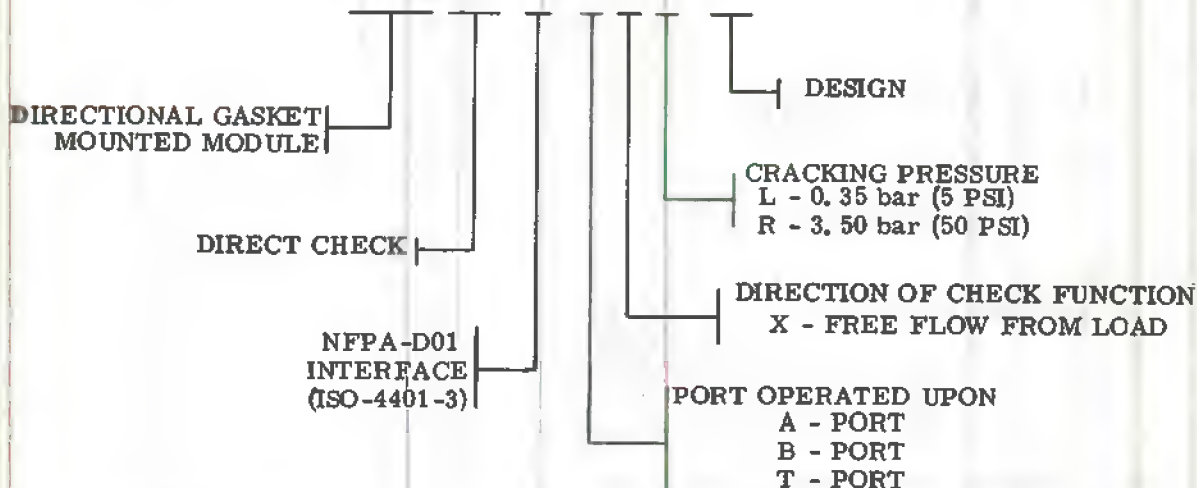
* AVAILABLE ONLY IN KITS OF 25 EACH

NOTE: THIS UNIT IS OF METRIC DESIGN

▲ INCLUDED IN F3 SEAL KIT 920107

MODEL CODE BREAKDOWN

DGM DC - 3 - * X * - 20



For satisfactory service life of these components in industrial applications, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from Vickers OFP, OFR, and OFRS series are recommended.

Litho in U. S. A.

SPRING OFFSET DIRECTIONAL VALVES

Service Parts Information

DG4S2(L)-012A-(**AC**)-50

DG4S4(L)-01*A-(**AC**)-50

NOTE
FOR 50/60 CYCLE SOLENOIDS
SEE BACK PAGE

RIGHT HAND ASSEMBLY SHOWN.
IN LEFT HAND ASSEMBLY ALL
PARTS OF VALVE EXCEPT BODY
ARE REVERSED. EXAMPLE OF
L. H. MODEL:
DG4S4(L)-012A-50-LH

VOLTAGE	SOLENOID S/A			
	S/A COMPLETE		COIL	
	STD	F3	STD	F3
115AC60	281291	317767	316011	317768
230AC60	281292	317769	298721	317770
460AC60	281293	317771	298722	317772

FOR ADDITIONAL
SOLENOID S/A'S
SEE I-3544-S.

213268 PUSH PIN
(LONGER THAN
220234)

INCLUDED
IN
SOLENOID

▲262328 "O" RING
750040 PLUNGER
750024 RETAINER
345825 SCREW
*345824 SCREW
(4 REQ'D)
345913 GASKET
416834 RIVET
(4 REQ'D)

281423 WASHER
▲262327 "O" RING
281422 GUIDE

174638 SCREW
(4 REQ'D)

IDENTIFICATION
PLATE

286122 WIRE &
GASKET S/A

36212 SCREW

FOR MODELS WITHOUT
SOLENOID INDICATOR
LIGHT.
(SEE BACK PAGE FOR
INDICATOR LIGHT PARTS)

64765 PLUG
185645 SCREW
(4 REQ'D)

236451 SPRING
▲281545 GASKET
236797 RETAINING
RING (2 REQ'D)

▲262354 "O" RING
(2 REQ'D)
287968 COVER

7074
PLUG

281547
SPACER

237976 SPRING

◆281421 BODY

▲262334 "O" RING (5 REQ'D)

MODEL	DIAGRAM PLATE	
	RH	LH
DG4S2(L)-	290347	577488
DG4S4(L)-	290348	577490

MODEL	SPOOL	PUSH PIN	LIMITER (2 REQ'D)	GUIDE	"O" RING
DG4S2(L)-012A-(*)-50	220344	—	—	281424	—
DG4S4(L)-010A-(*)-50	213230	—	—	—	—
DG4S4(L)-012A-(*)-50	213231	220234	294226	284931	262327
DG4S4(L)-016A-(*)-50	213232	—	—	—	▲

▲INCLUDED IN F3
SEAL KIT 919214

◆NOT AVAILABLE
FOR SALE

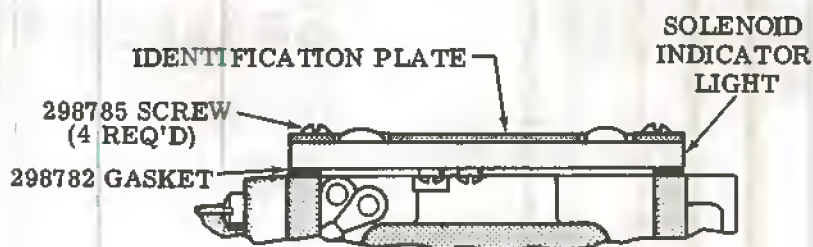
*TORQUE TO
30 - 35 lb. in.

**SOLENOID INDICATOR LIGHT KITS
(INCLUDES ALL PARTS IDENTIFIED)**

VOLTAGE RANGE	KIT
100 thru 125	941615

NOTE
REFER TO PARTS DRAWING
I-3487-S FOR MODELS WITH
PLUG-IN FEATURE.

**FOR MODELS WITH
SOLENOID INDICATOR LIGHT**



50/60 HERTZ SOLENOIDS		
MODEL	SOLENOID S/A	COIL
DG*S4-****-115AC-50/60-50	751137	751057
F3-DG*S4-****-115AC-50/60-50	751407	751406

LEAD WIRE IDENTIFICATION

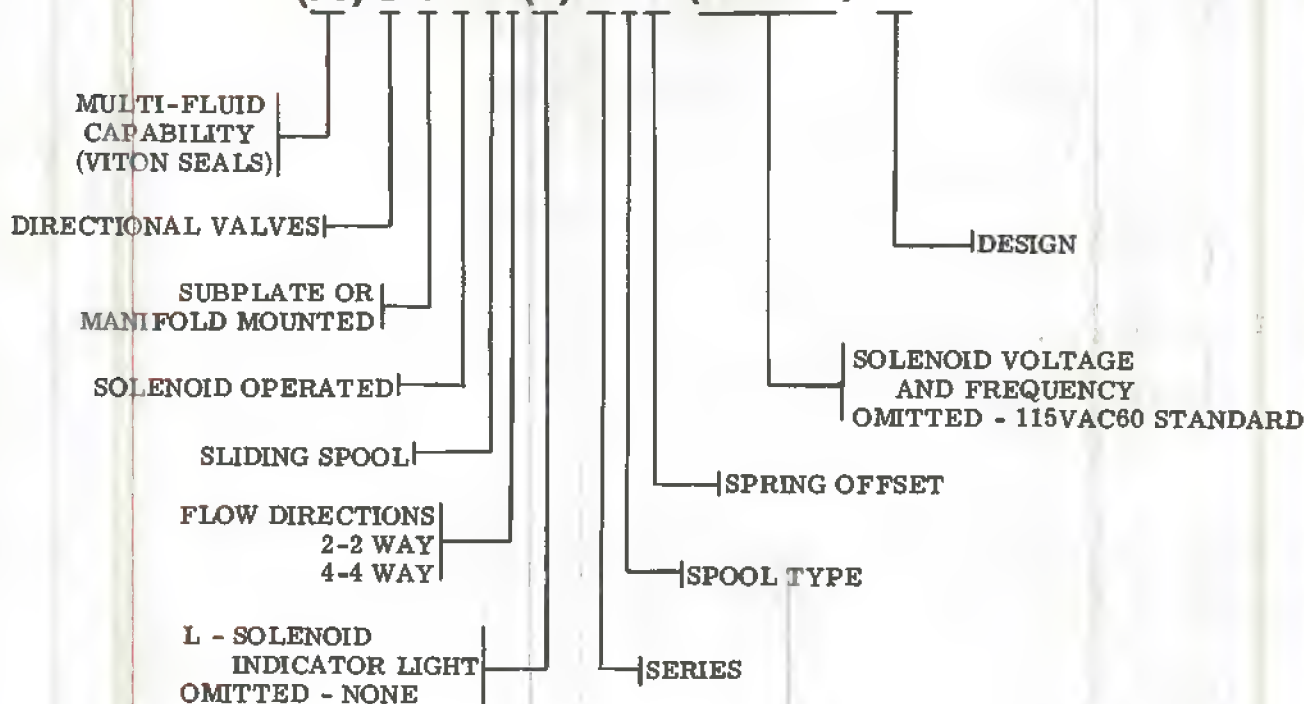
RED LEAD - COMMON
YELLOW LEAD - 60 Hz.
BLUE LEAD - 50 Hz.

CAUTION

FOR 50 CYCLE OPERATION USE RED AND BLUE LEADS
FOR 60 CYCLE OPERATION USE RED AND YELLOW LEADS
DO NOT USE BLUE AND YELLOW LEADS TOGETHER

MODEL CODE BREAKDOWN

(F3)-D G 4 S*(L)-01*A-(AC**)-50**



For satisfactory service life of these components in industrial applications, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from Vickers OFP, OFR, and OFRS series are recommended.

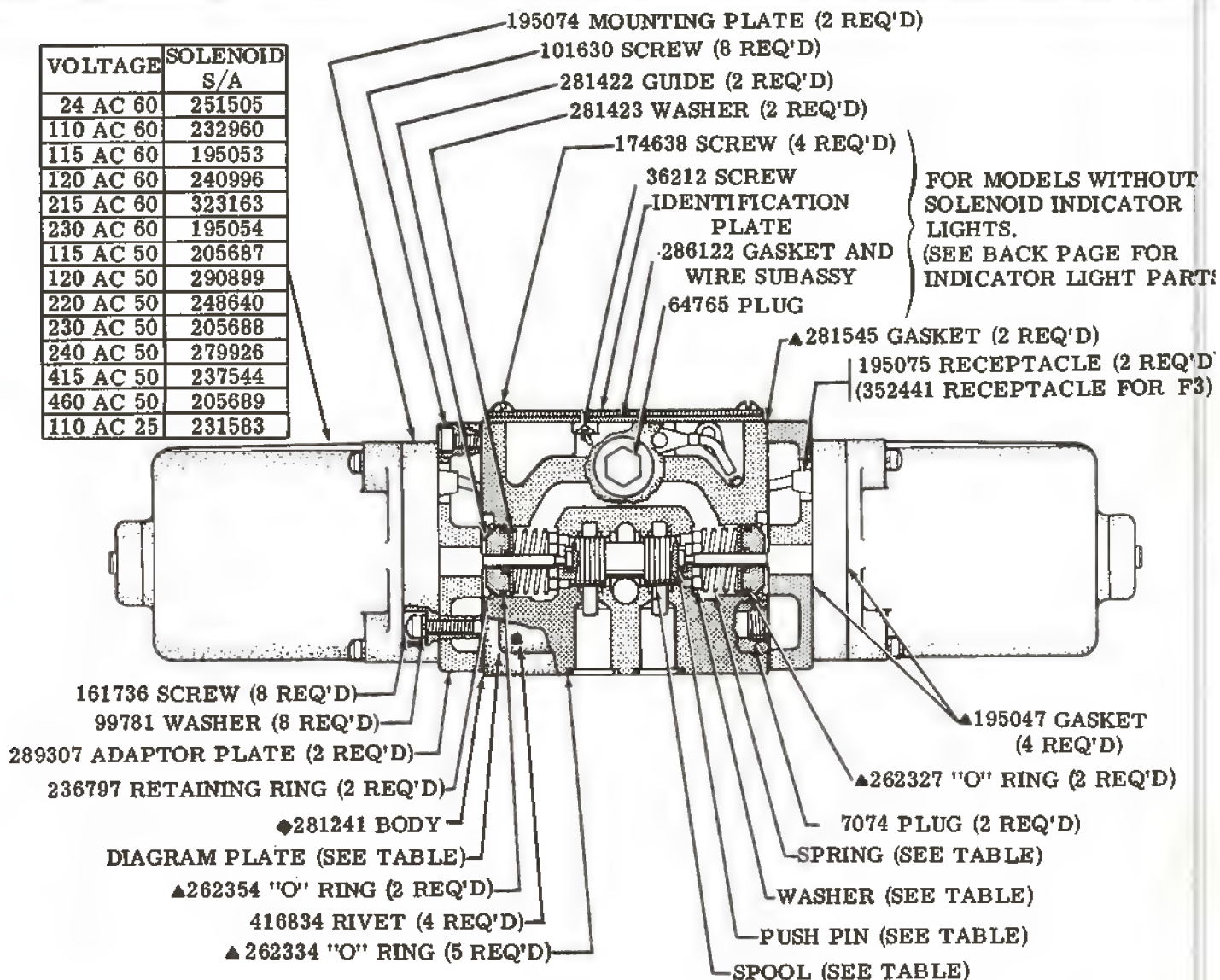
Litho in U. S. A.

SPRING CENTERED SOLENOID CONTROLLED DIRECTIONAL VALVES

Service Parts Information

DG4S4(L)-01*C-H-(*AC*)-50

VOLTAGE	SOLENOID S/A
24 AC 60	251505
110 AC 60	232960
115 AC 60	195053
120 AC 60	240996
215 AC 60	323163
230 AC 60	195054
115 AC 50	205687
120 AC 50	290899
220 AC 50	248640
230 AC 50	205688
240 AC 50	279926
415 AC 50	237544
460 AC 50	205689
110 AC 25	231583

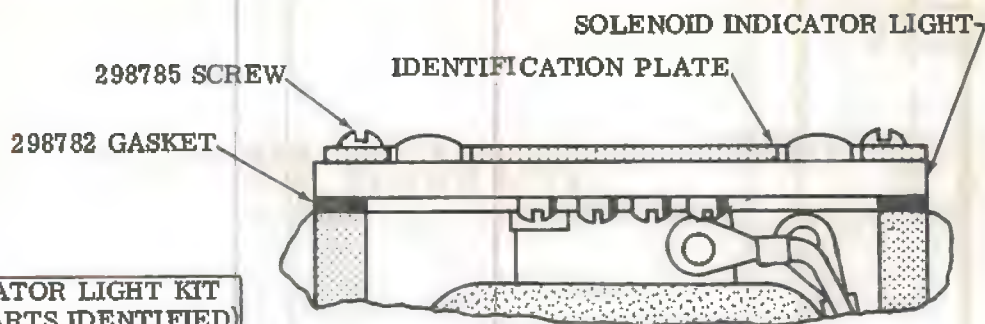


◆ NOT AVAILABLE
FOR SALE

▲ INCLUDED IN F3
919359 SEAL KIT

★ ASSEMBLE ON SPOOL WITH
SHARP BREAK EDGE OF
WASHER TOWARD SPRING

MODEL	DIAGRAM PLATE	SPOOL	WASHER (2 REQ'D)	SPRING (2 REQ'D)	PUSH PIN (2 REQ'D)
DG4S4-010C-H-(*)-50	290341	213230	211846	290072	289340
DG4S4-012C-H-(*)-50	290343	213231	211846	290072	289340
DG4S4-013C-H-(*)-50	290344	239903	211846	290072	289340
DG4S4-016C-H-(*)-50	290345	213232	211846	290072	289340
DG4S4-017C-H-(*)-50	290346	236624	211846	290072	289340
DG4S4-018C-H-(*)-50	290340	235637	★283637	217323	290320
DG4S4-0133C-H-(*)-50	577484	236615	211846	290072	289340

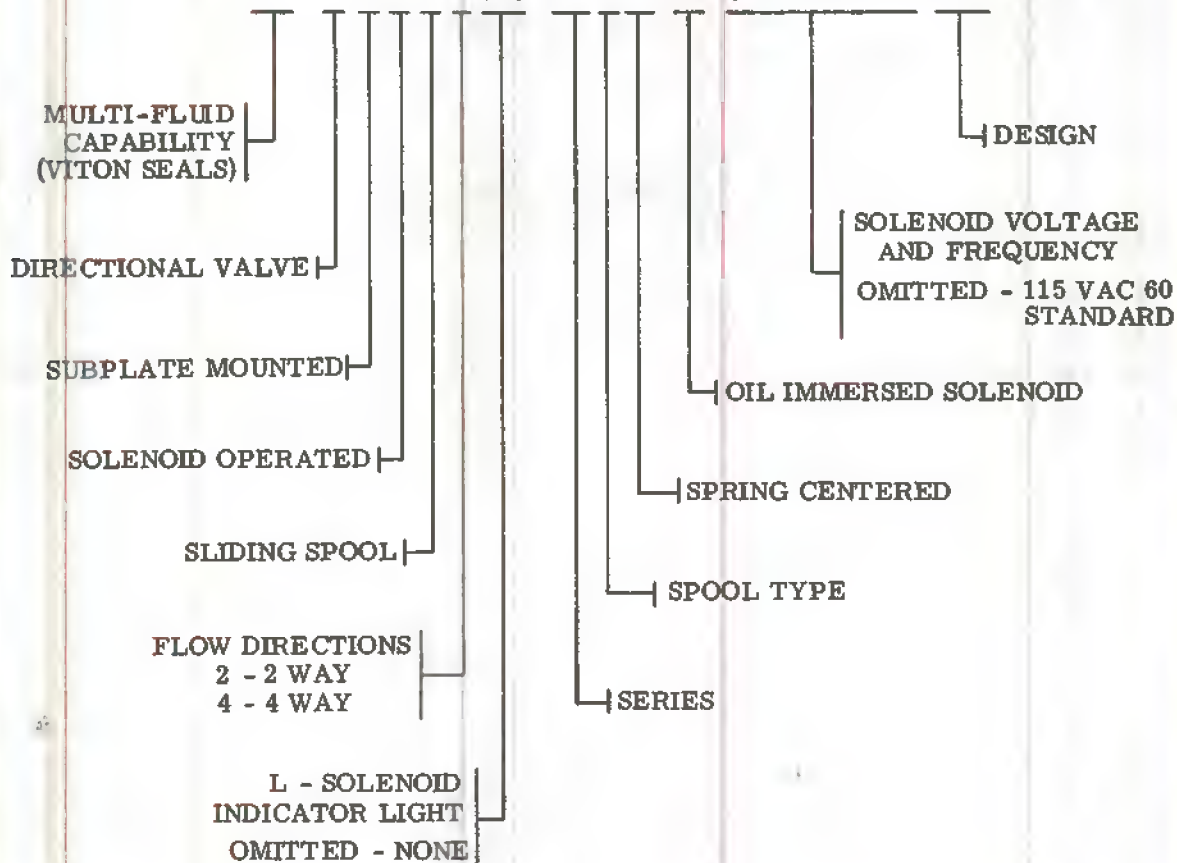


SOLENOID INDICATOR LIGHT KIT (INCLUDES ALL PARTS IDENTIFIED)	
VOLTAGE RANGE	KIT
100 thru 125	941615

NOTE
REFER TO PARTS DRAWING I-3487-S FOR
MODELS WITH PLUG-IN FEATURE.

MODEL CODE BREAKDOWN

F3-DG4S*(L)·01*C-H-(AC*)·50**



For satisfactory service life of these components in industrial applications, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from Vickers OFFP, OFR, and OFRS series are recommended.

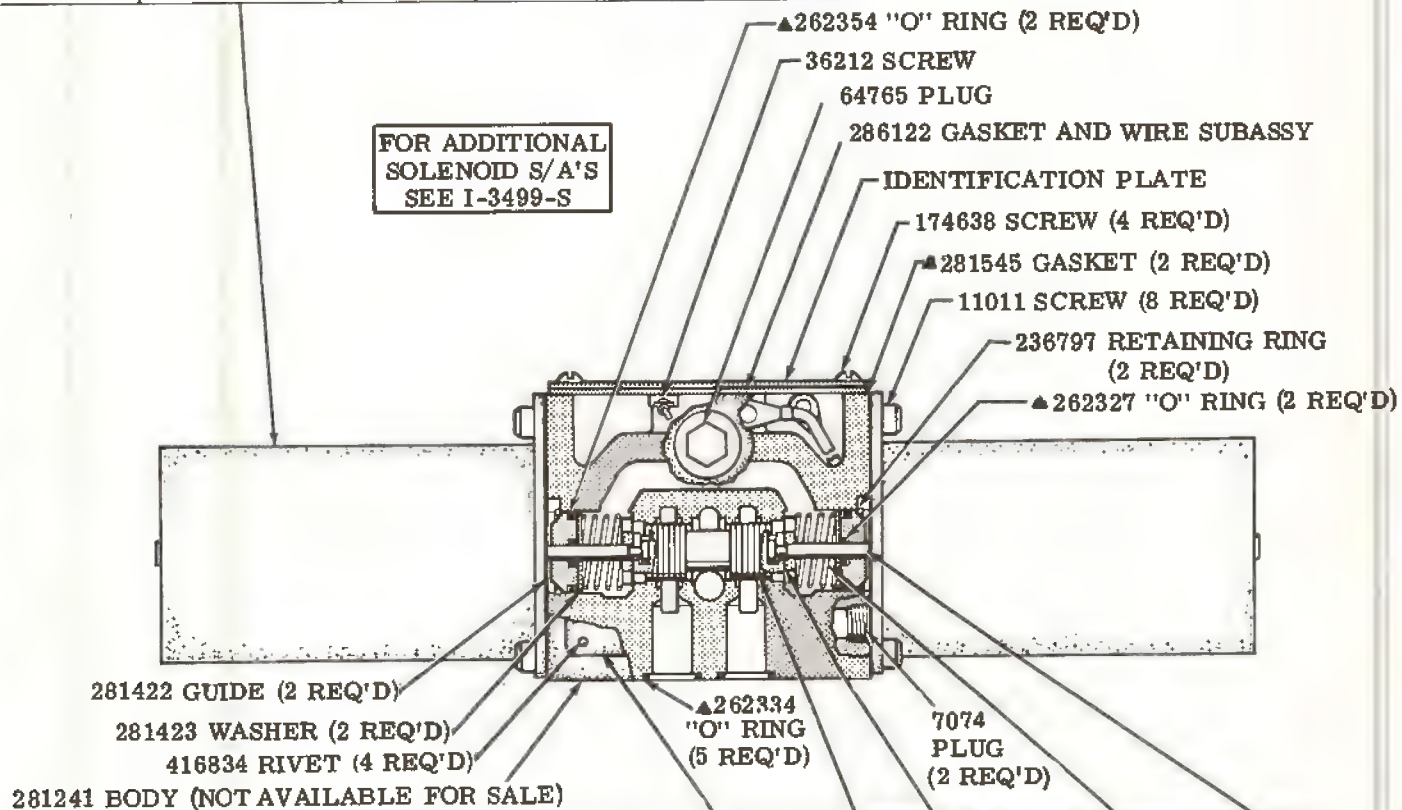
Litho in U. S. A.

**SPRING CENTERED
SOLENOID CONTROLLED
DIRECTIONAL VALVES**

Service Parts Information

DG4S4-01*C-DC-50

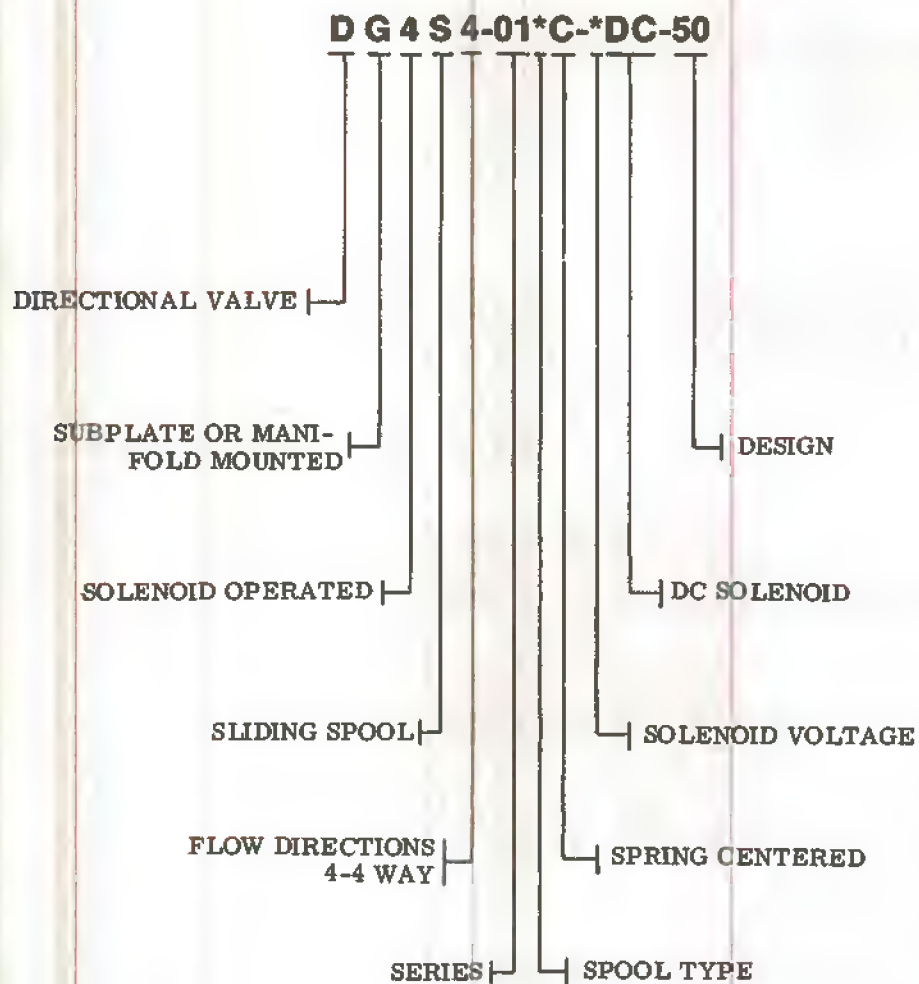
VOLTAGE	SOLENOID S/A (2 REQ'D)	COIL S/A (2 REQ'D)	SOLENOID S/A F3 (2 REQ'D)	COIL S/A F3 (2 REQ'D)
12 DC	290839	291583	751283	751284
24 DC	290840	291584	393091	393090



▲INCLUDED IN
SEAL KIT 919359

MODEL	DIAGRAM PLATE	SPOOL	WASHER (2 REQ'D)	SPRING (2 REQ'D)	PUSH PIN (2 REQ'D)
DG4S4-010C-*DC-50	290341	213230			
DG4S4-012C-*DC-50	290343	213231			
DG4S4-013C-*DC-50	290344	239903	211846	290072	213268
DG4S4-016C-*DC-50	290345	213232			
DG4S4-017C-*DC-50	290346	236624			
DG4S4-018C-*DC-50	290340	235637	283637	217323	290264
DG4S4-0133C-*DC-50	577484	236615	211846	290072	213268

MODEL CODE BREAKDOWN



For satisfactory service life of these components, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from Vickers OFP, OFR, and OFRS series are recommended.

Litho in U.S.A.

Service Parts Information

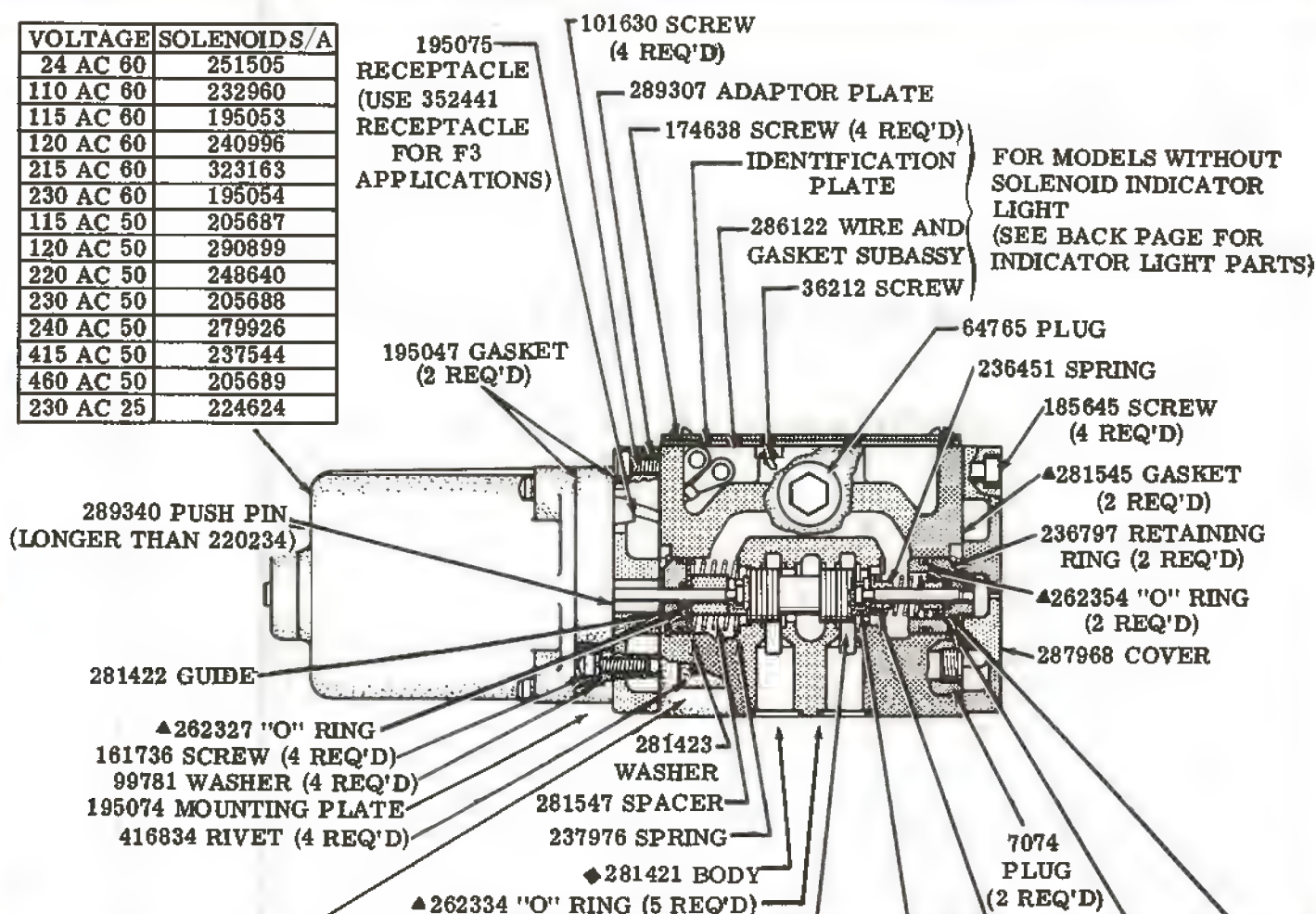
VICKERS

A TRIMONA COMPANY

SPRING OFFSET SOLENOID CONTROLLED DIRECTIONAL VALVES

DG4S*(L)-01*-A-H-(* * * AC*)-50

VOLTAGE	SOLENOIDS/A
24 AC 60	251505
110 AC 60	232960
115 AC 60	195053
120 AC 60	240996
215 AC 60	323163
230 AC 60	195054
115 AC 50	205687
120 AC 50	290899
220 AC 50	248640
230 AC 50	205688
240 AC 50	279926
415 AC 50	237544
460 AC 50	205689
230 AC 25	224624



MODEL	DIAGRAM PLATE	
	RH	LH
DG4S2(L)-	290347	577488
DG4S4(L)-	290348	577490

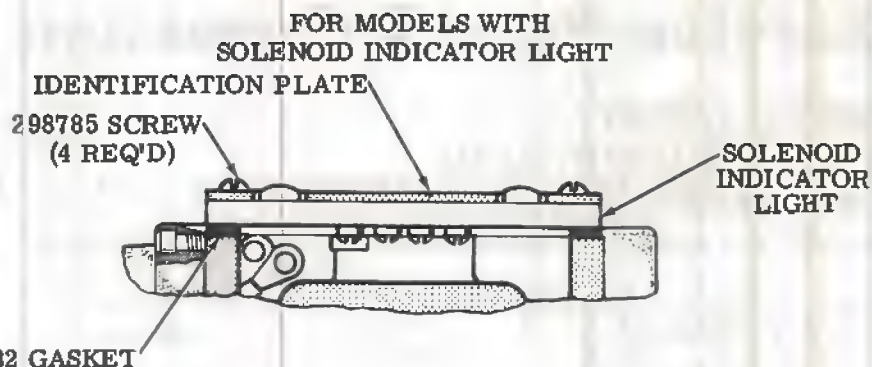
MODEL	SPOOL	PUSH PIN	LIMITER (2 REQ'D)	GUIDE	"O" RING
DG4S2(L)-012A-H-(*)-50	220344	—	—	281424	—
DG4S4(L)-010A-H-(*)-50	213230	—	—	—	—
DG4S4(L)-012A-H-(*)-50	213231	220234	294226	284931	▲262327
DG4S4(L)-016A-H-(*)-50	213232	—	—	—	—

RIGHT HAND ASSEMBLY SHOWN. IN LEFT HAND ASSEMBLY ALL PARTS OF VALVE EXCEPT BODY ARE REVERSED. EXAMPLE OF L.H. MODEL: DG4S4-012A-H-50-LH

▲INCLUDED IN F3 SEAL KIT 919359

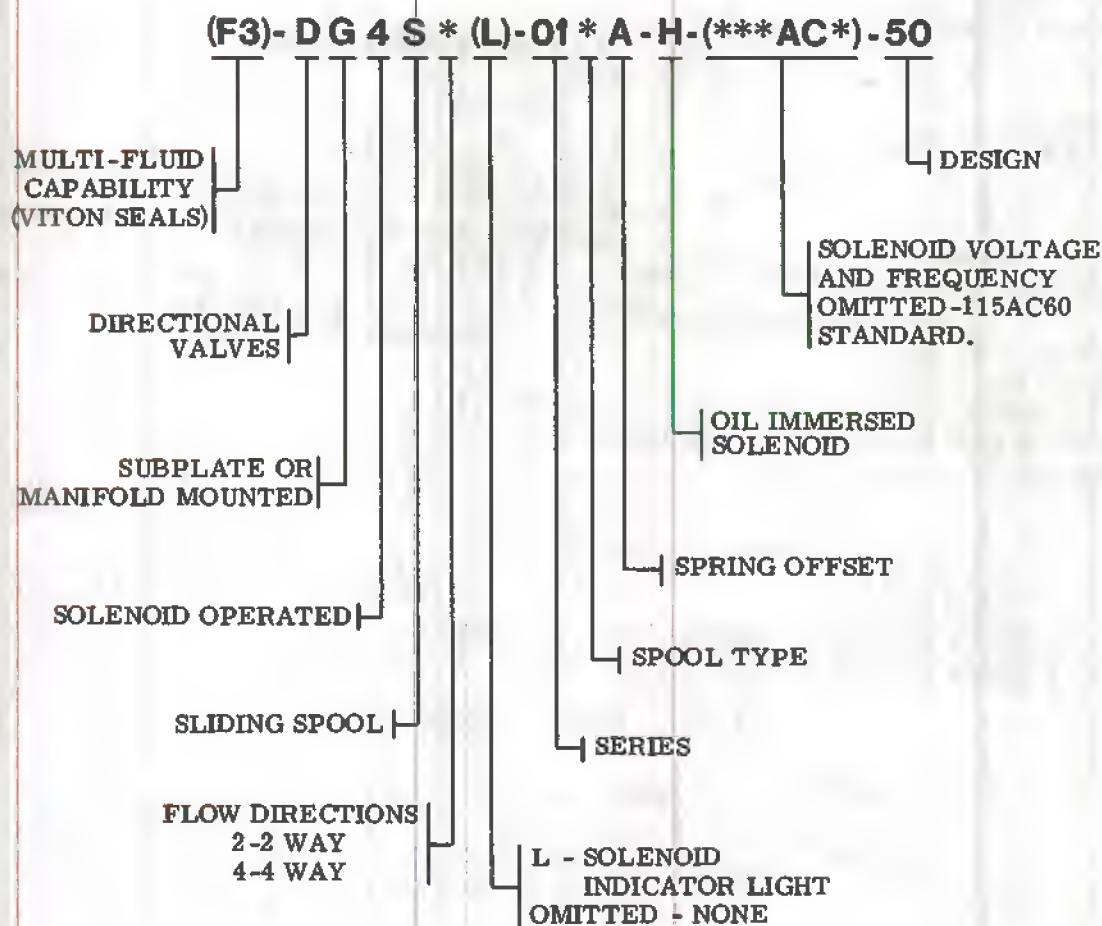
◆NOT AVAILABLE FOR SALE

SOLENOID INDICATOR LIGHT KIT (INCLUDES ALL PARTS IDENTIFIED)	
VOLTAGE RANGE	KIT
100 thru 125	941615



NOTE
REFER TO PARTS DRAWING
I-3487-S FOR MODELS WITH
PLUG-IN FEATURE.

MODEL CODE BREAKDOWN



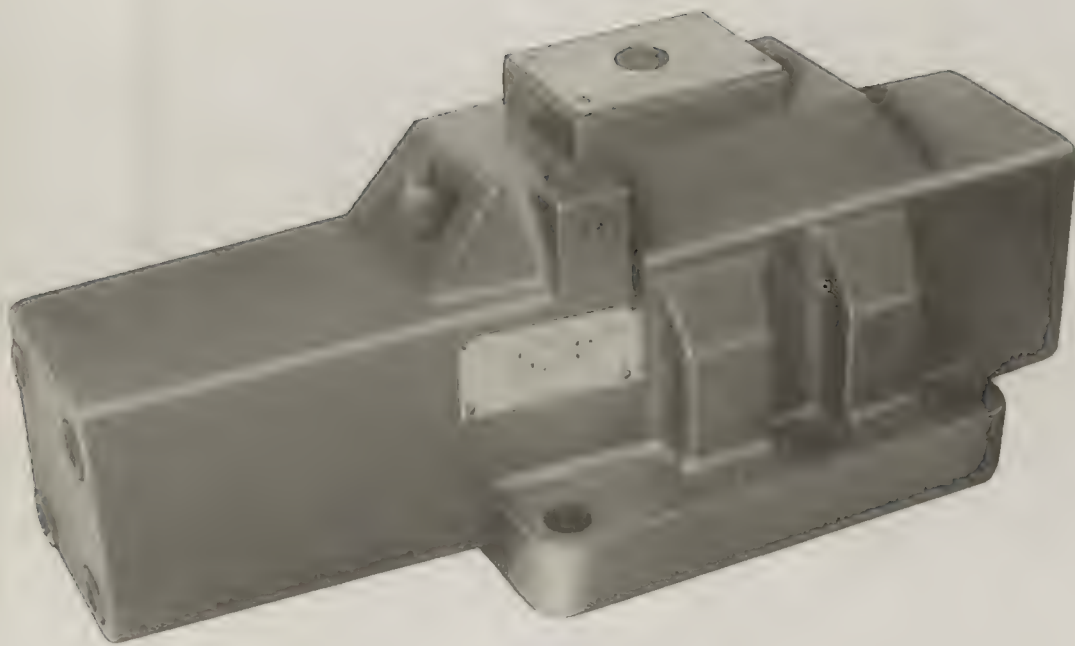
For satisfactory service life of these components, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from Vickers OFP, OFR, and OFRS series are recommended.

VICKERS

Service Parts Information

**Pressure
Centered
Pilot Operated
Directional
Control Valves**

DG3S4-10*D*-*-53



Vickers, Incorporated

1401 Crooks Road
Troy, Michigan 48064

Revised 11-1-85

I-3569-S

A Libbey-Owens-Ford Company

●267966 SCREW (4 REQ'D)

NAMEPLATE

COVER ATTACHING BOLTS

MODEL	BOLT (4 REQ'D)
W/OUT PILOT CHOKE	□ 1031
WITH PILOT CHOKE (SEE BACK PAGE)	Ø10935
TORQUE TO 100-112 lb.in. (11.3 ~ 12.7 N.m)	

3656 COVER

▲262342 "O" RING (2 REQ'D)

◇298168 SCREW (4 REQ'D)
TORQUE TO 150-170 lb. ft.
(203.4-230.5 N.m.)

■*7074 PLUG

■*363889 PLUG

▲263495 "O" RING

■*407533 PLUG

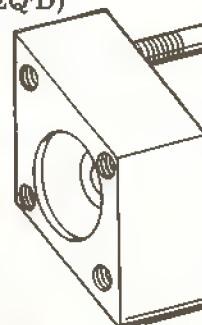
■*407533 PLUG

493 "O" RING

▲263493 "O" RING

▲263493 "O" RING (2 REQ'D)

■*407533 PLUG
(2 REQ'D)



276948 COVER

▲262409 "O" RING

110540 SPRING

107758 WASHER

▲263493 "O" RING (2 REQ'D)

■*407533 PLUG (2 REQ'D)

■*7074 PLUG

▲263495 "O" RING

■*363889 PLUG

195940 REST PIN (2 REQ'D)

▲154014 "O" RING (NITRILE)

(RILE)

26 "O" RING (4 REQ'D)
(A, B, P & T PORTS)

▲263493 "O" RING

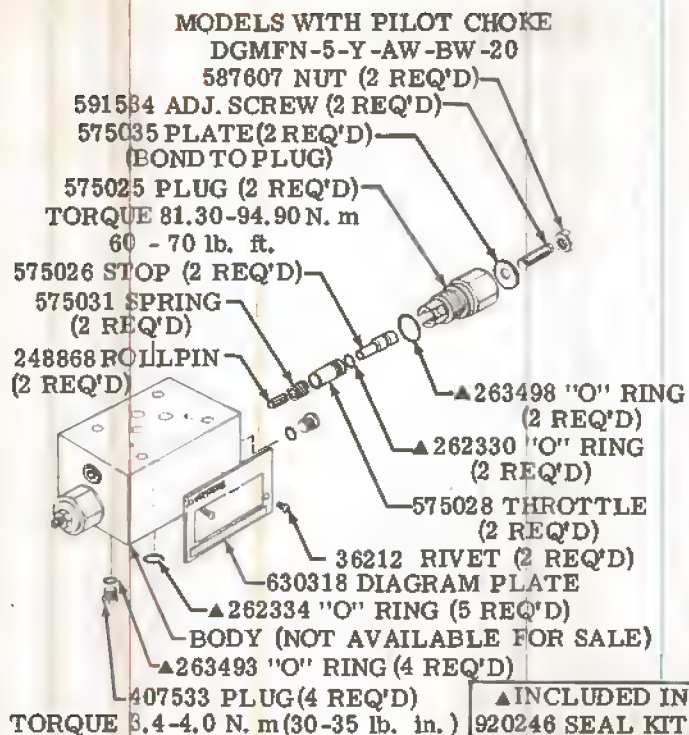
■*407533 PLUG

▲263494 "O" RING (2 REQ'D)

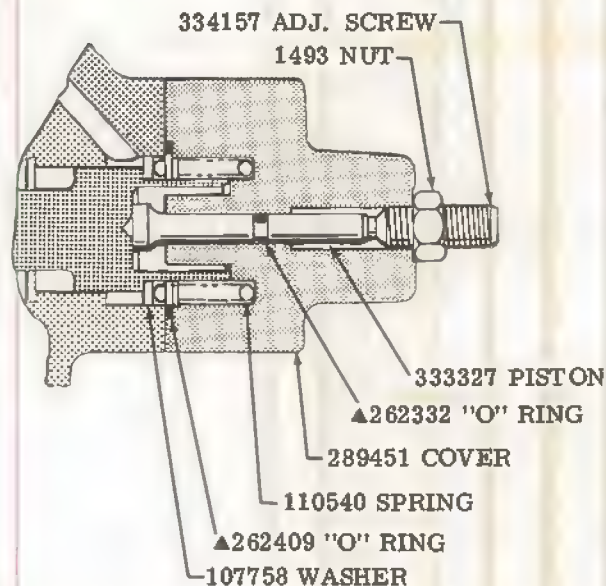
■*343740 PLUG (2 REQ'D)

NOTE

SAE STRAIGHT THREAD PLUGS
USED ON EXTERIOR OF VALVE



**STROKE ADJUSTMENT PARTS
("B" END ONLY)**



MODEL CODE BREAKDOWN

(F3) - DG 3 S 4 - 10 * D (X) - * - 53

SEALS FOR MINERAL OIL
OR FIRE RESISTANT FLUID

DIRECTIONAL VALVE

SUBPLATE OR
MANIFOLD MOUNTED

PILOT OPERATED

SLIDING SPOOL

FLOW DIRECTIONS
4 - 4 WAY

DESIGN

SPOOL CONTROL MODIFICATION
(OMIT IF NOT REQUIRED)
2 - PILOT CHOKE ADJS.
8 - STROKE ADJUSTMENT
CYLINDER "B" END ONLY
2-8 - IF BOTH ARE REQUIRED

X - FAST RESPONSE MODEL
OMITTED - STD LOW SHOCK MODELS

PRESSURE CENTERED

SPOOL TYPE

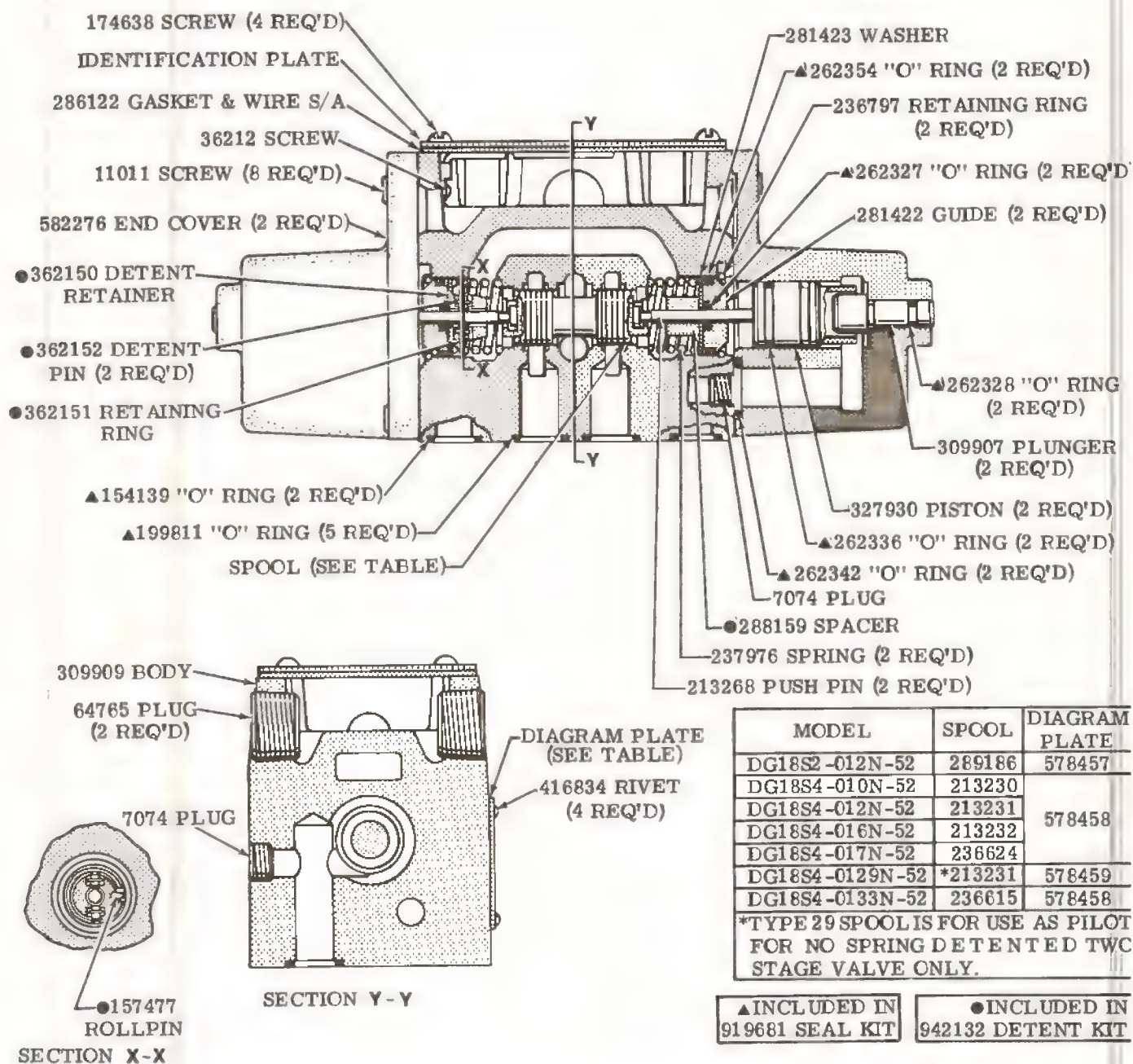
SERIES 100
(1.250 INCH)

For satisfactory service life of these components, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from Vickers OFP, OFR, and OFRS series are recommended.

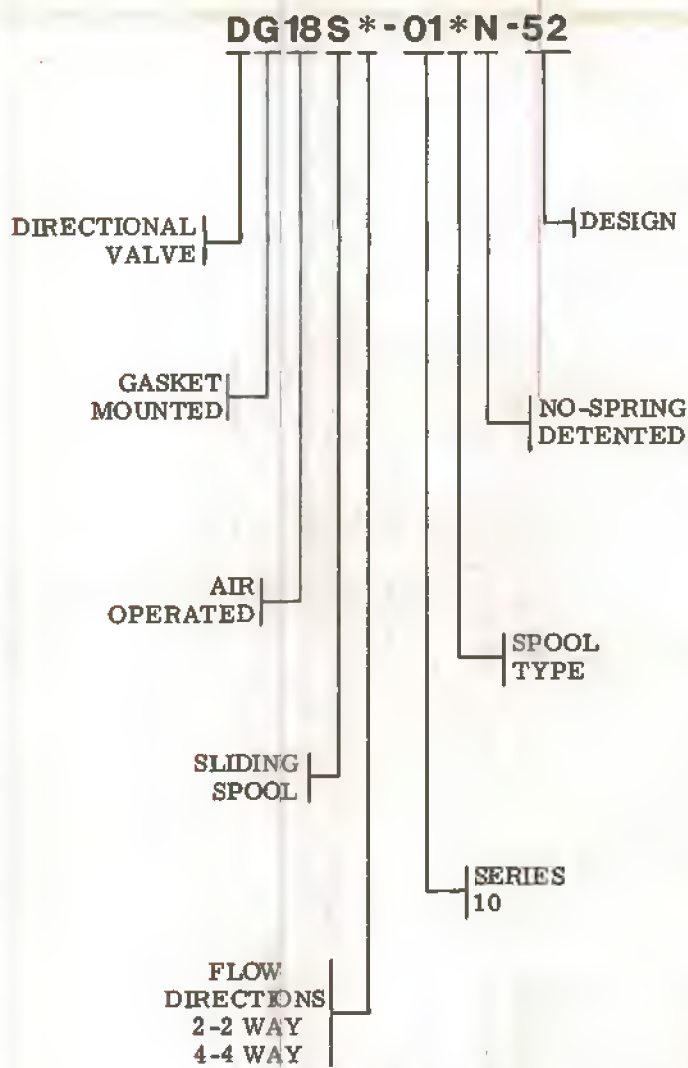
**NO-SPRING DETENTED
AIR OPERATED
DIRECTIONAL VALVES**

Service Parts Information

DG18S2-012N-52
DG18S4-01*(*)N-52



MODEL CODE BREAKDOWN



For satisfactory service life of these components, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from Vickers OFF, OFR, and OFRS series are recommended.

Litho in U. S. A.

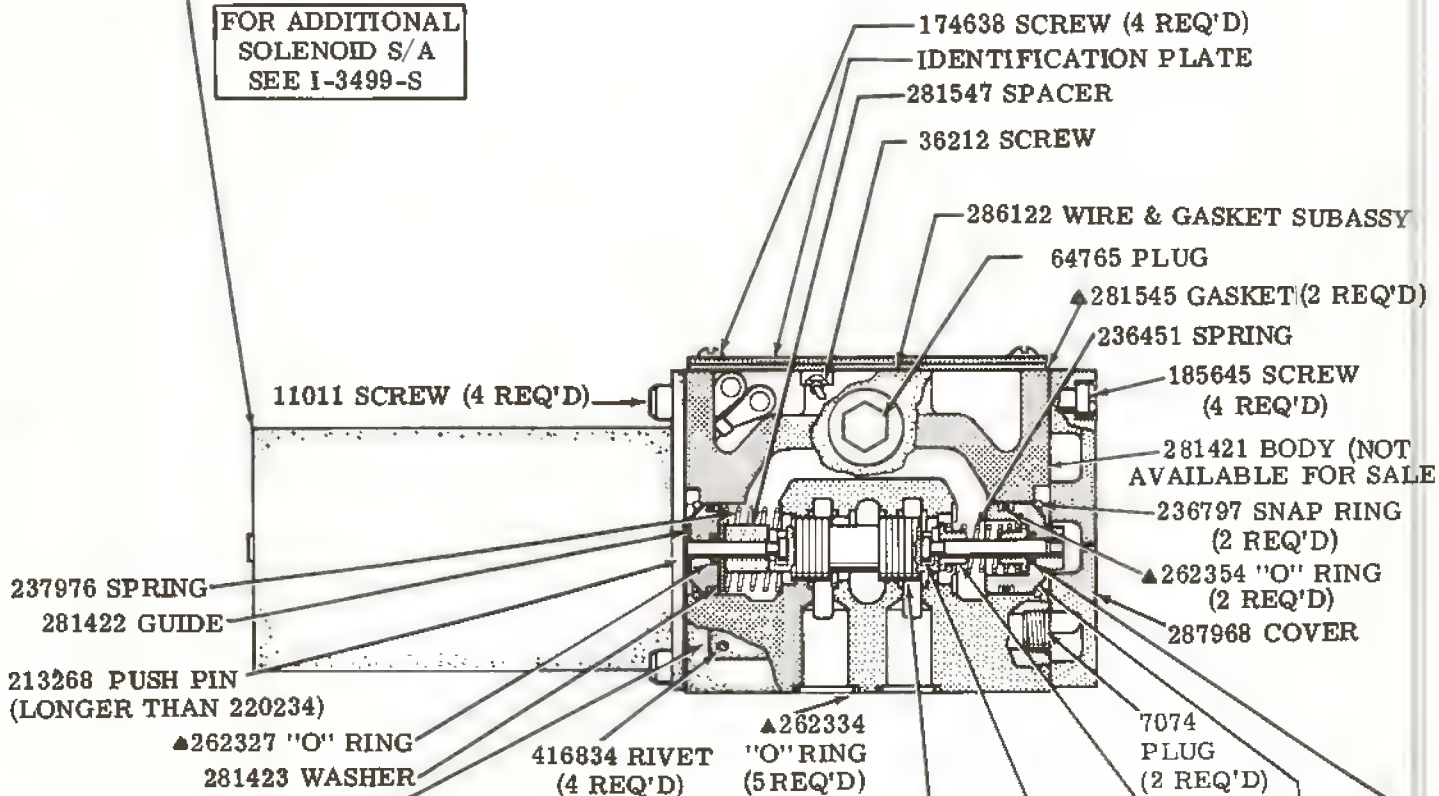
SPRING OFFSET SOLENOID CONTROLLED DIRECTIONAL VALVES

Service Parts Information

DG4S2-012A-*DC-50
DG4S4-01*A-*DC-50

VOLTAGE DC	SOLENOID S/A (2 REQ'D)	COIL S/A (2 REQ'D)	SOLENOID S/A F3 (2 REQ'D)	COIL S/A F3 (2 REQ'D)
12	290839	291583	751283	751284
24	290840	291584	393091	393090

FOR ADDITIONAL
SOLENOID S/A
SEE I-3499-S



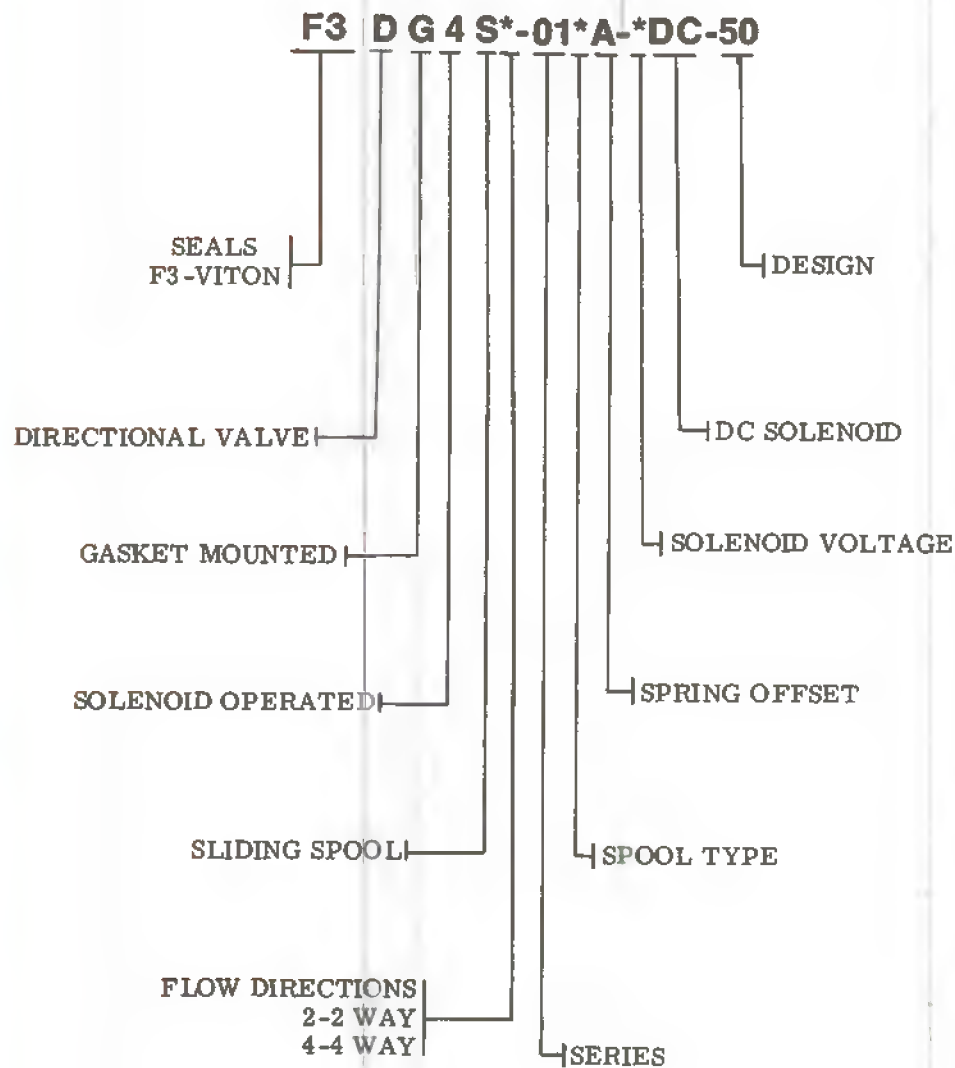
MODEL	DIAGRAM PLATE	
	RH	LH
DG4S2 (L)-	290347	577488
DG4S4 (L)-	290348	577490

MODEL	SPOOL	PUSH PIN	LIMITER (2 REQ'D)	GUIDE	▲"O" RING
DG4S2-012A-*DC-50	220344	—	—	281424	—
DG4S4-010A-*DC-50	213230	—	—	—	—
DG4S4-012A-*DC-50	213231	220234	294226	284931	262327
DG4S4-016A-*DC-50	213232	—	—	—	—

RIGHT HAND ASSEMBLY SHOWN.
IN LEFT HAND ASSEMBLY ALL
PARTS OF VALVE EXCEPT BODY
ARE REVERSED. EXAMPLE OF
L. H. MODEL:
DG4S4-012A-*DC-50-LH

▲INCLUDED IN F3
SEAL KIT 919359

MODEL CODE BREAKDOWN



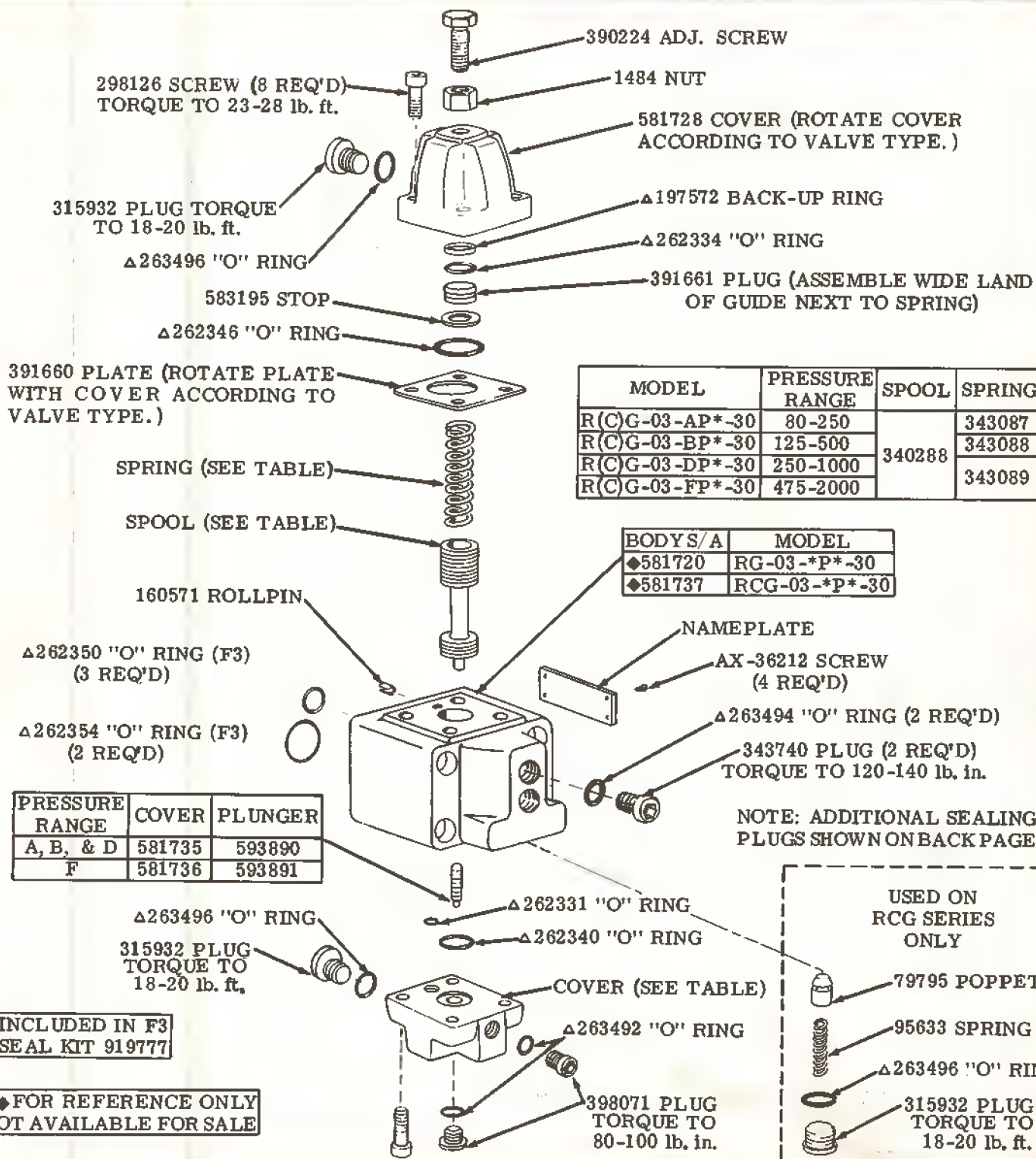
For satisfactory service life of these components, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from Vickers OFP, OFR, and OFRS series are recommended.

Litho in U. S. A.

Service Parts Information

PRESSURE CONTROL VALVES

R(C)G-03-*P*-30



Vickers, Incorporated
1401 Crooks Road
Troy, Michigan 48064

Revised 11-1-85

I-3653-S

MODEL CODE BREAKDOWN

(F3)- R (C) G-03-*P*-30

SPECIAL SEALS
(OMIT FOR STD.
MODELS)

PRESSURE
CONTROL VALVE

"C" - WITH INTEGRAL CHECK VALVE
(REVERSE FREE FLOW)
OMITTED - WITHOUT CHECK VALVE

MOUNTING
MANIFOLD OR SUBPLATE

NOMINAL VALVE SIZE
03 - 3/8"

PRESSURE RANGE
A - 80-250 P.S.I.
B - 125-500 P.S.I.
D - 250-1000 P.S.I.
F - 475-2000 P.S.I.

DESIGN

VALVE TYPES
(INSET VIEWS AT
BOTTOM OF PAGE
SHOW COVER PO-
SITIONS FOR THE
(4) VALVE TYPES)

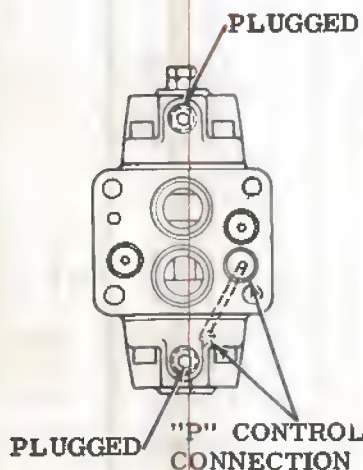
AUXILIARY REMOTE PRESSURE
CONTROL CONNECTION

TYPICAL MODEL NUMBER
RCG-03-DP4-30

NOTE: ASSEMBLE COVERS AS SHOWN TO OBTAIN VALVE ACTION DESIRED.

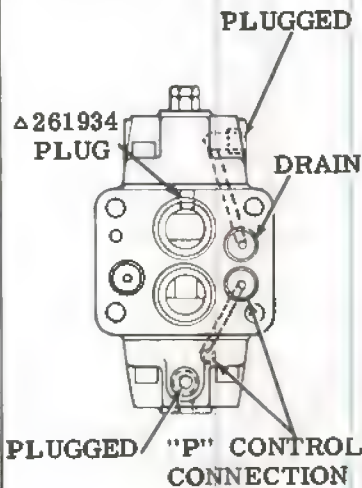
TYPE 1

RG SERIES - BACK
PRESSURE VALVE
RCG SERIES -
COUNTERBALANCE
VALVE
DIRECTLY CONTROLLED
INTERNAL DRAIN



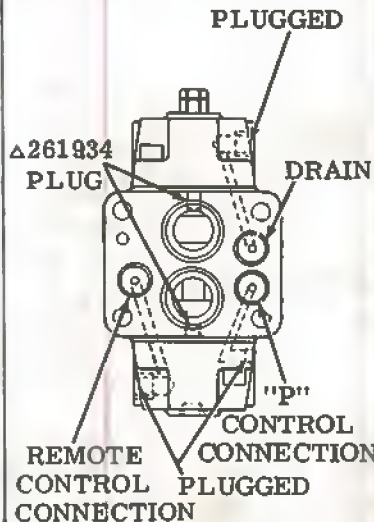
TYPE 2

RG OR RCG SERIES-
SEQUENCE VALVES
DIRECTLY CONTROLLED
EXTERNAL DRAIN



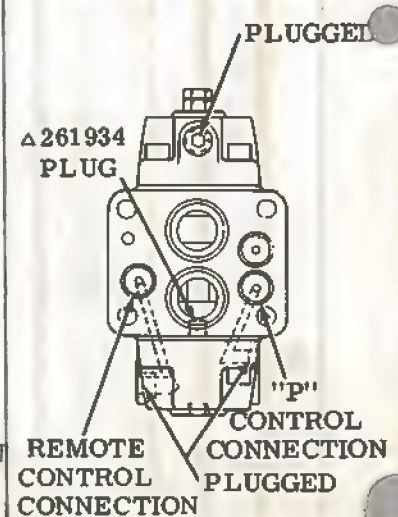
TYPE 3

RG OR RCG SERIES-
SEQUENCE VALVES
REMOTELY CONTROLLED
EXTERNAL DRAIN



TYPE 4

RG SERIES-
UNLOADING VALVE
RCG SERIES-
COUNTERBALANCE
VALVE
REMOTELY CONTROLLED
INTERNAL DRAIN



For satisfactory service life of these components, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from Vickers OFF, OFR, and OFRS series are recommended.

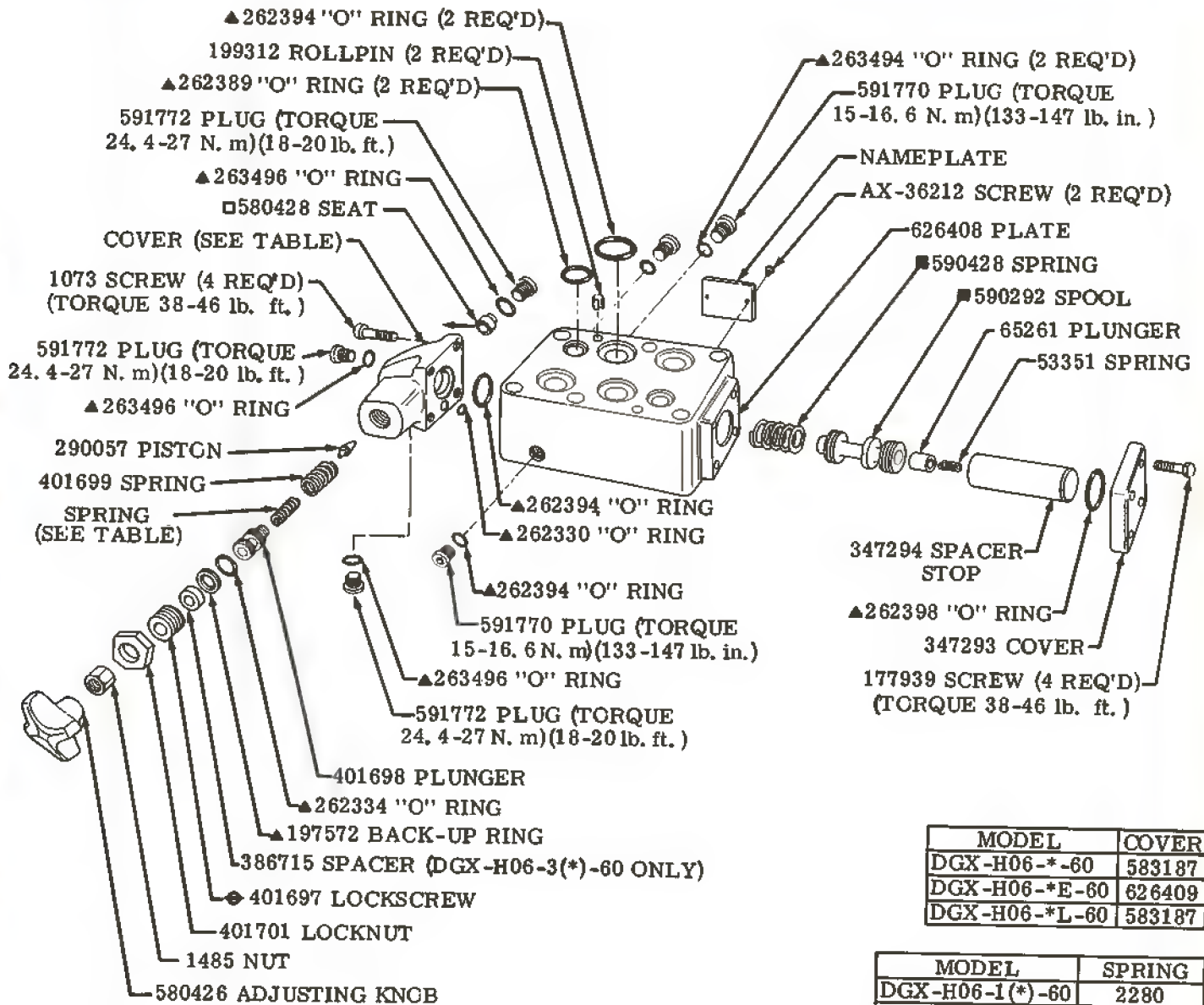
Litho in U. S. A.

Service Parts Information

**PRESSURE
REDUCING
VALVES**



(F3)DGX-H06-*(*)-60



MODEL	COVER
DGX-H06-* -60	583187
DGX-H06-*E-60	626409
DGX-H06-*L-60	583187

MODEL	SPRING
DGX-H06-1(*)-60	2280
DGX-H06-2(*)-60	583937
DGX-H06-3(*)-60	401700

■ INCLUDED IN SPOOL KIT 941390

▲SERVICE ALL UNITS
W/F3 SEAL KIT 920126

⊕ASSEMBLE 401697 LOCKSCREW
WITH STEPPED O.D. END TOWARD
386715 SPACER OR PLUNGER.

NOTE
ASSEMBLE SEAT IN COVER WITH
CROSSHOLE POINTING IN DIREC-
TION OF ARROW. COIN PISTON
TO NEW SEAT.

Vickers, Incorporated
1401 Crooks Road
Troy, Michigan 48064

Revised 12-1-87

I-3646-S

MODEL CODE BREAKDOWN

(F3) DGX - H06 - * (*) - 60

SEALS FOR
MINERAL OIL
AND FIRE
RESISTANT
FLUIDS

DIRECTIONAL
CONTROL

SUBPLATE OR
MANIFOLD
MOUNTED

PRESSURE
REDUCING
MODULE

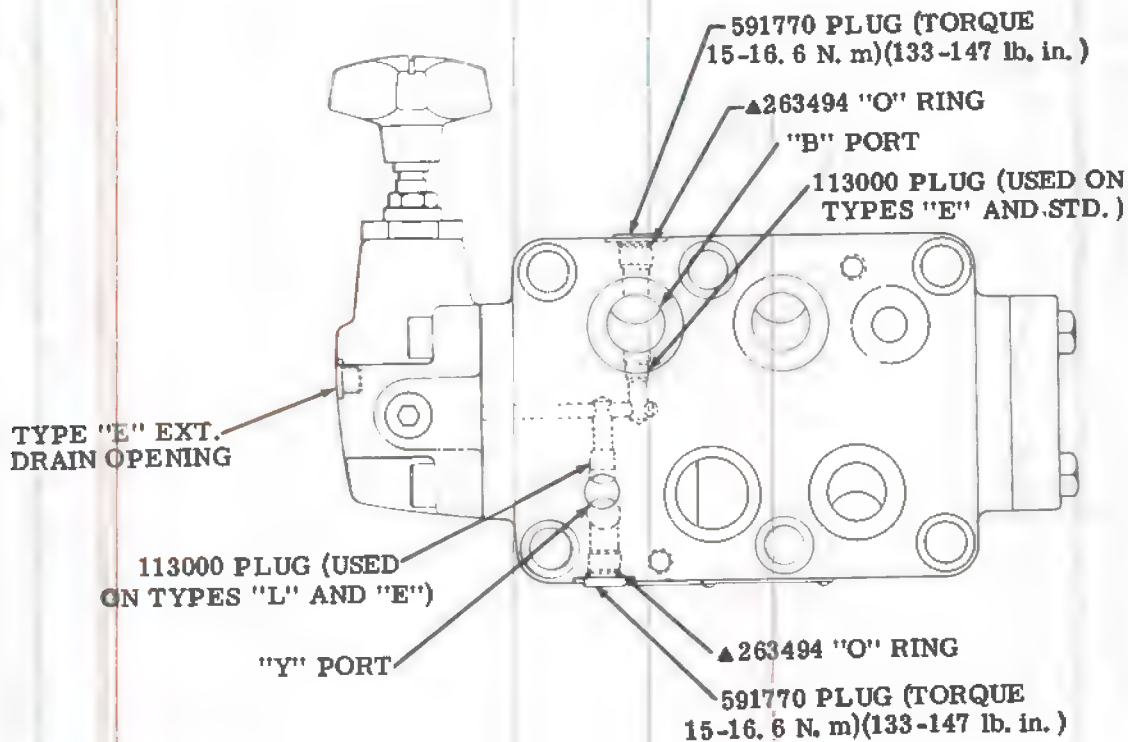
DESIGN

(OMITTED) STD. EXT. DRAINED
TO "Y" PORT.
TYPE "E" EXT. DRAINED THRU
COVER.
TYPE "L" INT. DRAINED TO
"B" PORT.

MAXIMUM ADJUSTABLE PRESSURE
1-1000 PSI, 2-2000 PSI, 3-2850 PSI

06 - 3/4 INCH SIZE

HIGH FLOW CAPACITY
70 USGPM MODEL



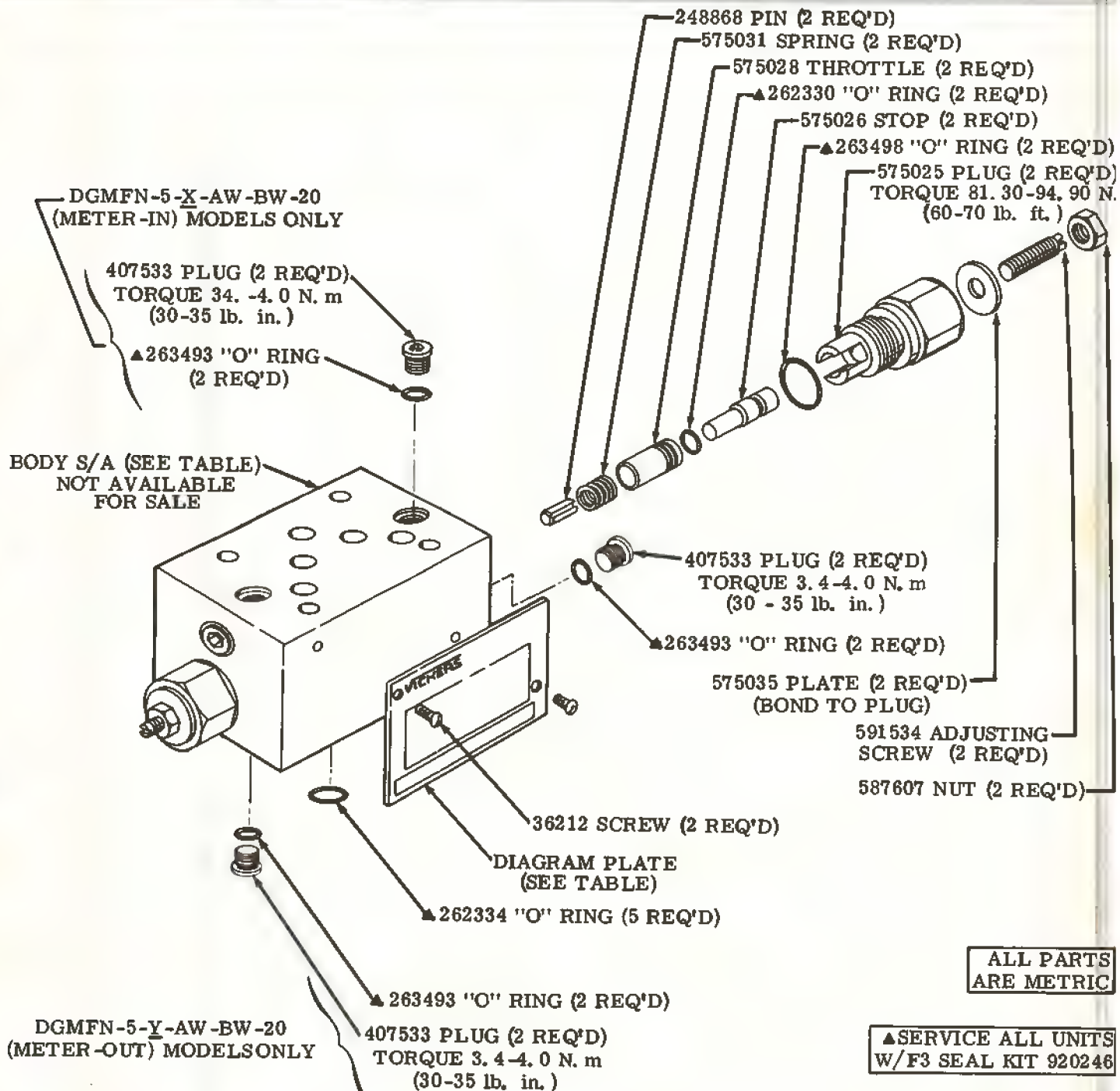
For satisfactory service life of these components, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from Vickers OFF, OFR, and OFRS series are recommended.

Litho in U. S. A.

FLOW CONTROL MODULE

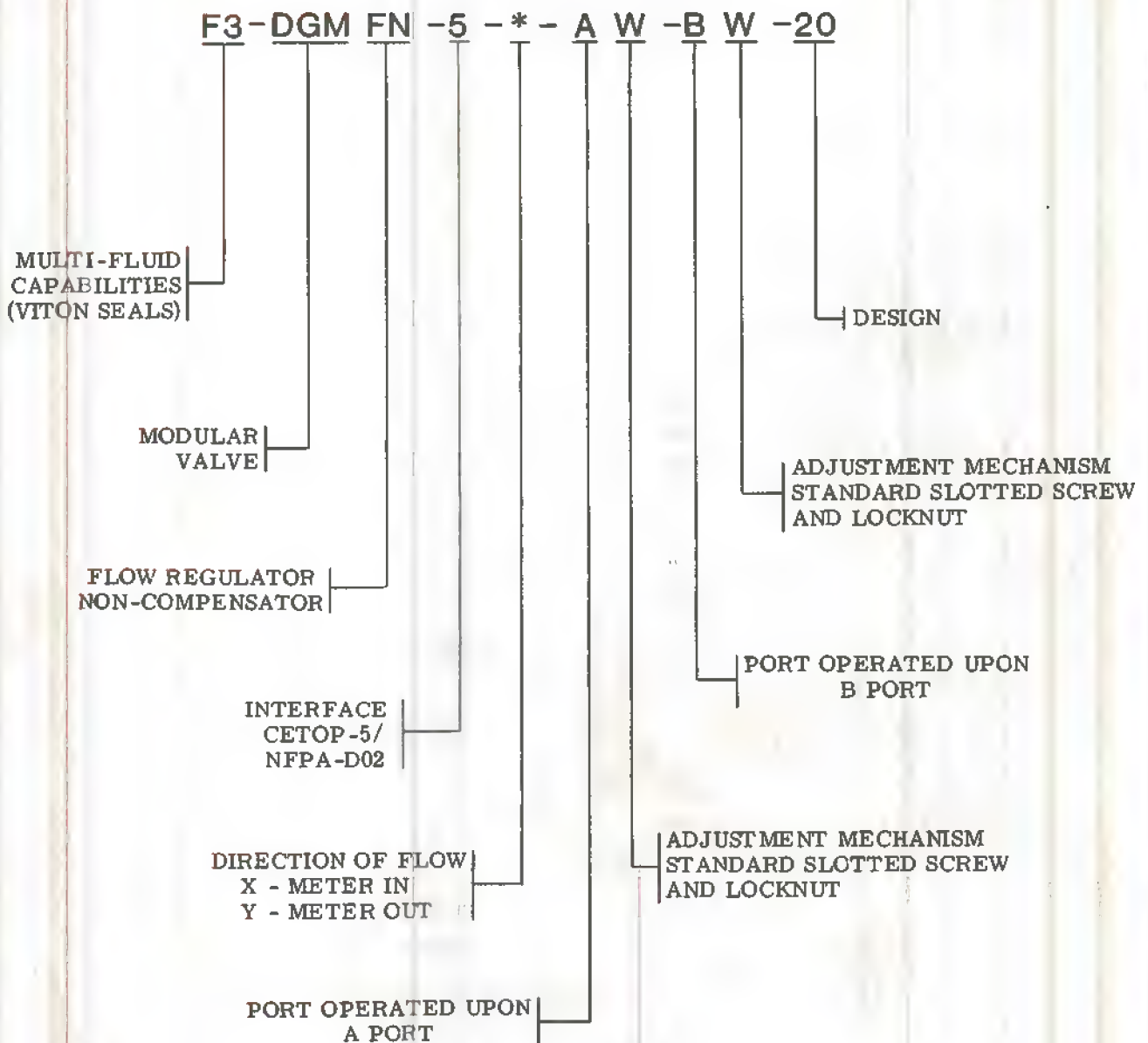
Service Parts Information

DGMFN-5-X-AW-BW-20 DGMFN-5-Y-AW-BW-20



MODEL	BODY S/A	DIAGRAM PLATE
DGMFN-5-X-AW-BW-20	587975	630317
DGMFN-5-Y-AW-BW-20	575039	630318

MODEL CODE BREAKDOWN



To insure sustained efficiency and maximum trouble free life of this precision equipment, initial and continuous full flow filtration of the fluid medium is essential. Select and apply filters from the Vickers OFP, OFR, and OFRS series, which are available in 3, 10, and 25 micrometre filtration ratings.

Litho in U. S. A.

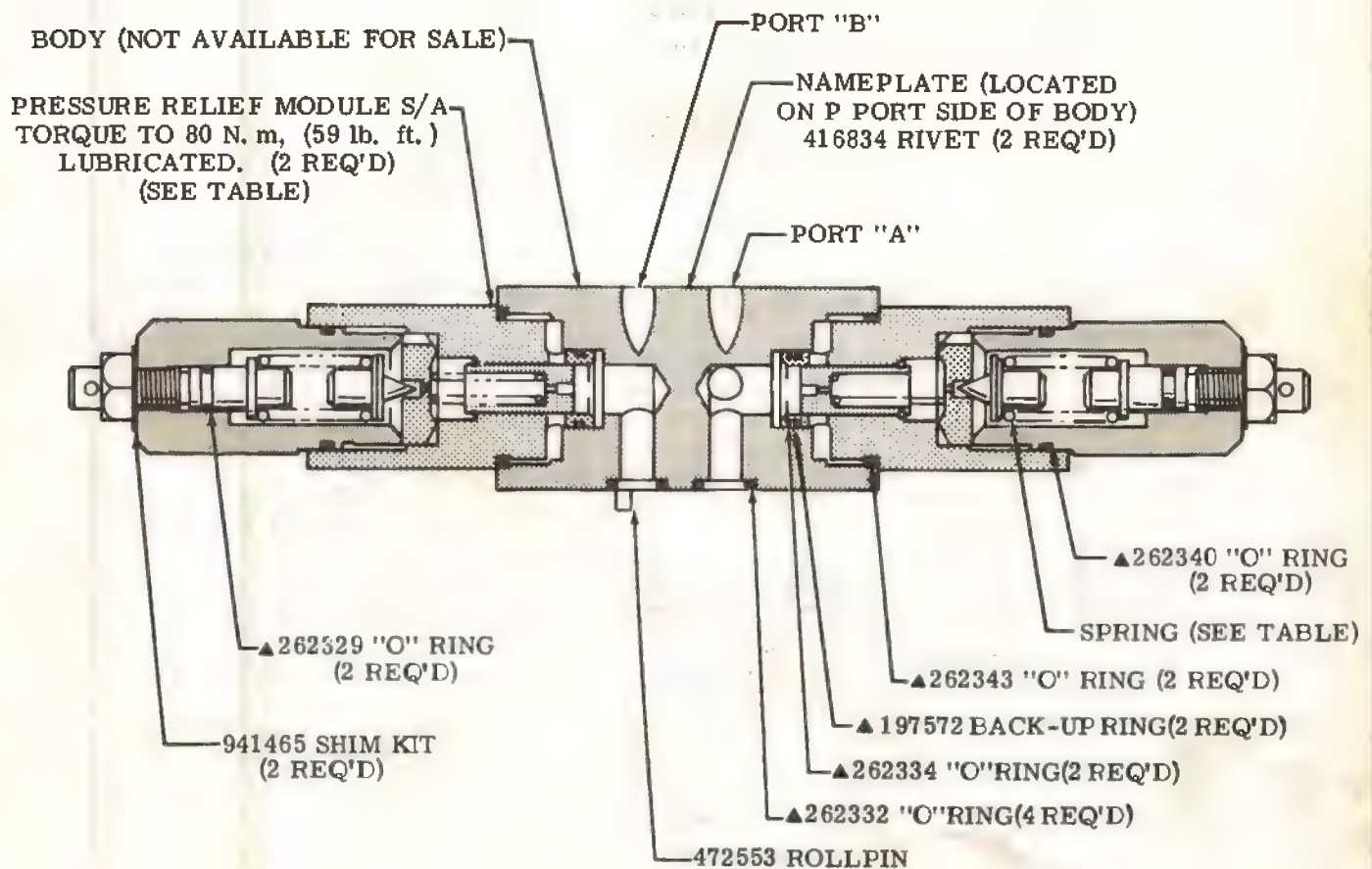
Service Parts Information



PRESSURE RELIEF MODULE

DGMC2-3-AB-*W-BA-*W-31

MODEL	SPRING	PRESSURE RELIEF MODULE S/A	PRESSURE RANGE	
			(bar)	(PSI)
DGMC2-3-AB-BW-BA-BW-31	531671	531928	10-70	145-1000
DGMC2-3-AB-CW-BA-CW-31	531672	531529	30-140	435-2000
DGMC2-3-AB-FW-BA-FW-31	531673	531930	50-250	725-3600



▲INCLUDED IN F3
SEAL KIT 920252

Vickers, Incorporated
1401 Crooks Road
Troy, Michigan 48064

RELEASED 5-1-87

I-3617-S

MODE CODE BREAKDOWN

DGM C2 - - A B -* W -B A -* W -31

1 2 3 4 5 6 7 8 9 10 11 12

1 Modular Valves

2 Type of Module
Service Line Relief

3 Interface
CETOP 3
NFPA-D-01

4 Port Operated Upon
A Port

5 Port Drained To
B Port

6 Pressure Controls
Adjustment Range bars (PSIG)
B - 10 to 70 (145-1000)
C - 30 to 140 (435-2000)
F - 50 to 250 (725-3600)

7 Adjustment Mechanism
Standard Wrench Adj.

8 Port Operated Upon
B Port

9 Port Drained To
A Port

10 Pressure Controls
Adjustment Range bars (PSIG)
B - 10 to 70 (145-1000)
C - 30 to 140 (435-2000)
F - 50 to 250 (725-3600)

11 Adjustment Mechanism
Standard Wrench Adj.

12 Design

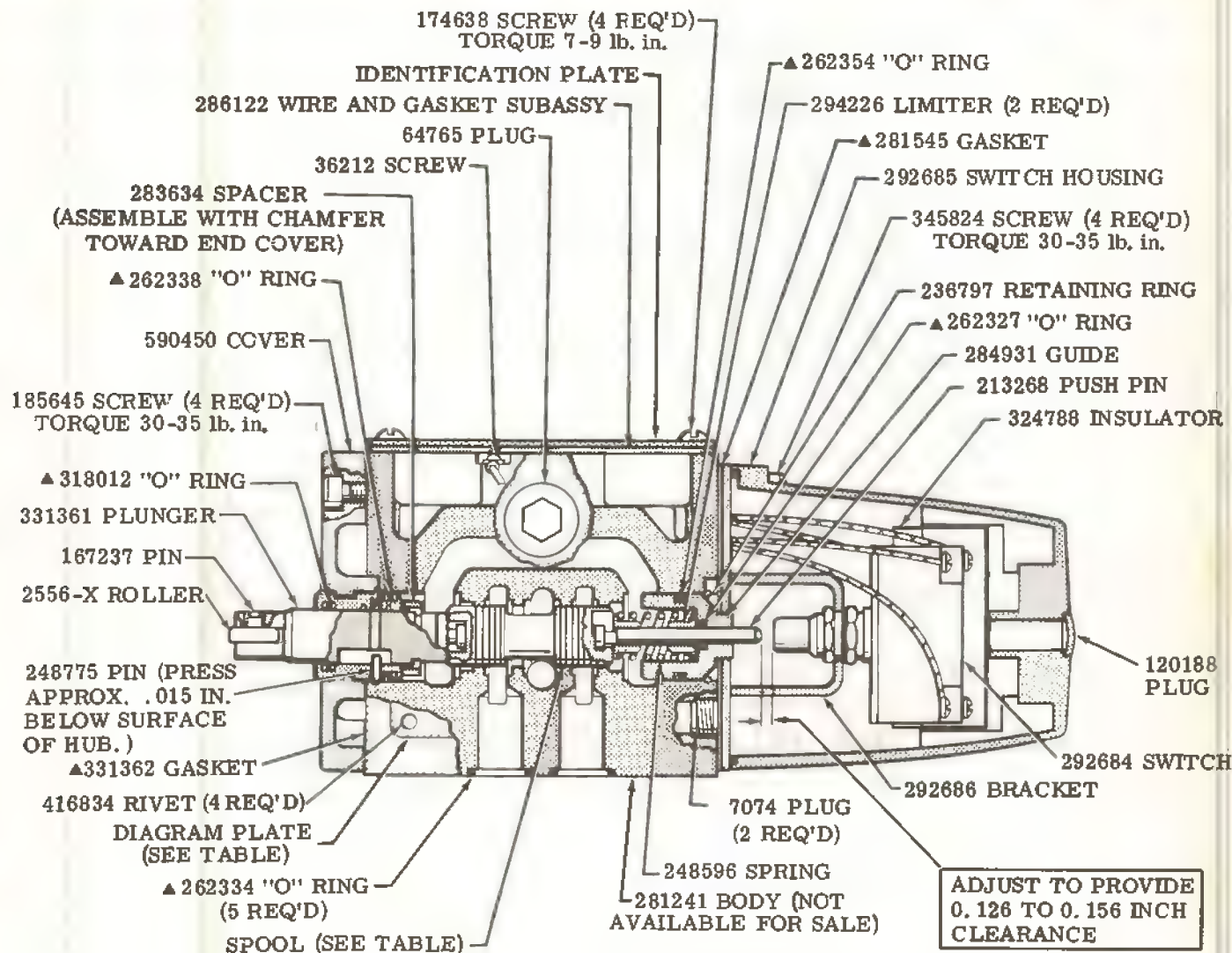
For satisfactory service life of these components, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from Vickers OFF, OFR and OFRS filter series are recommended.

Litho in U.S.A.

MECHANICALLY OPERATED DIRECTIONAL AND DECELERATION VALVES

Service Parts Information

SDG2S*-012A-52 DG2S*-01*A-52 DG16S2-010A-52

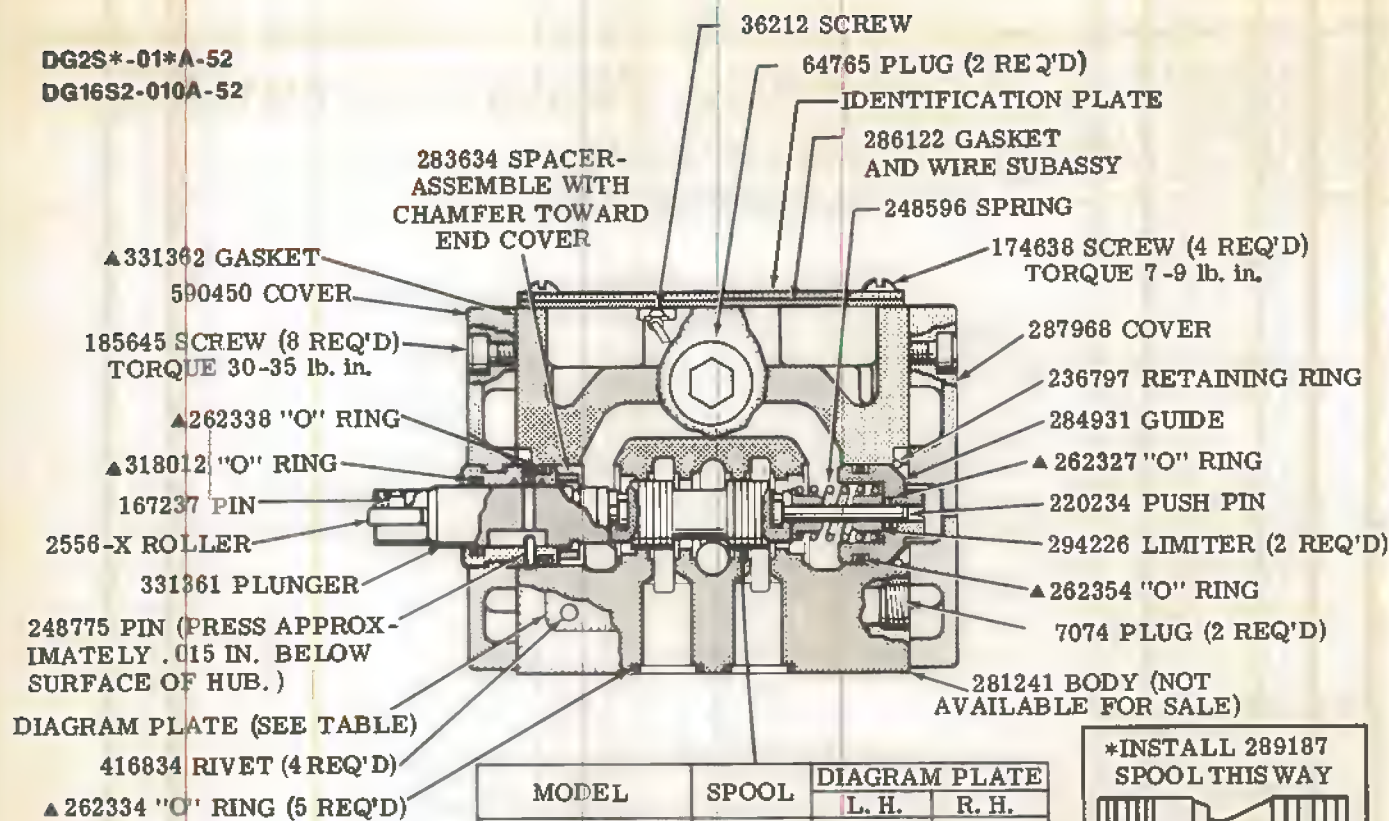


▲ SERVICE ALL UNITS
W/ F3 SEAL KIT 919432

MODEL	SPOOL	DIAGRAM PLATE	
		L. H.	R. H.
SDG2S2-012A-52(LH)	238966	578491	578490
SDG2S4-010A-52(LH)	213230		
SDG2S4-012A-52(LH)	213231		
SDG2S4-016A-52(LH)	213232	578493	578492
SDG2S4-017A-52(LH)	236624		

RIGHT HAND ASSEMBLY SHOWN.
IN LEFT HAND ASSEMBLY ALL
PARTS OF VALVE EXCEPT BODY
ARE REVERSED.
EXAMPLE OF L. H. MODEL:
SDG2S2-012A-52 -L. H.

DG2S*-01*A-52
DG16S2-010A-52



▲SERVICE ALL UNITS
W/F3 SEAL KIT 919432

MODEL	SPOOL	DIAGRAM PLATE	
		L. H.	R. H.
DG2S2-012A-52	289186	578491	578490
DG2S4-010A-52	213230		
DG2S4-012A-52	213231		
DG2S4-016A-52	213232	578493	578492
DG2S4-017A-52	236624		
DG2S4-0133A-52	236615		
DG16S2-010A-52	289187	578494	

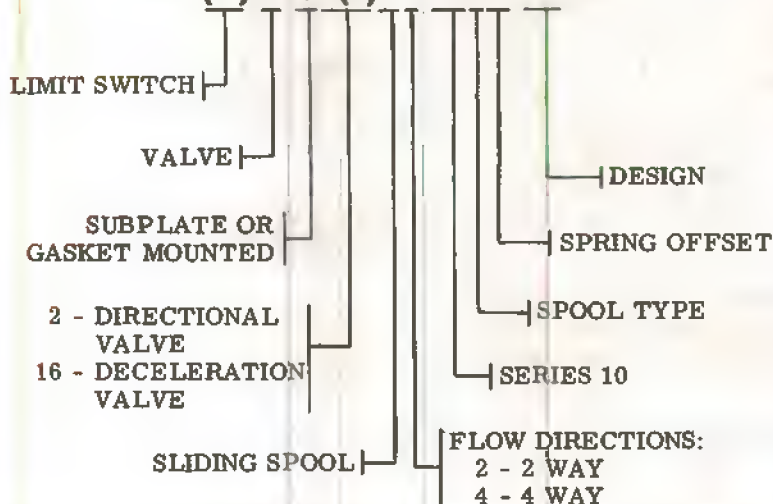
*INSTALL 289187
SPOOL THIS WAY



TOWARDS OPER-
ATING STEM

MODEL CODE BREAKDOWN

(S) D G*(*)S*-01*A-52



For satisfactory service life of these components, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from Vickers OFP, OFR, and OFRS series are recommended.

Litho in U. S. A.

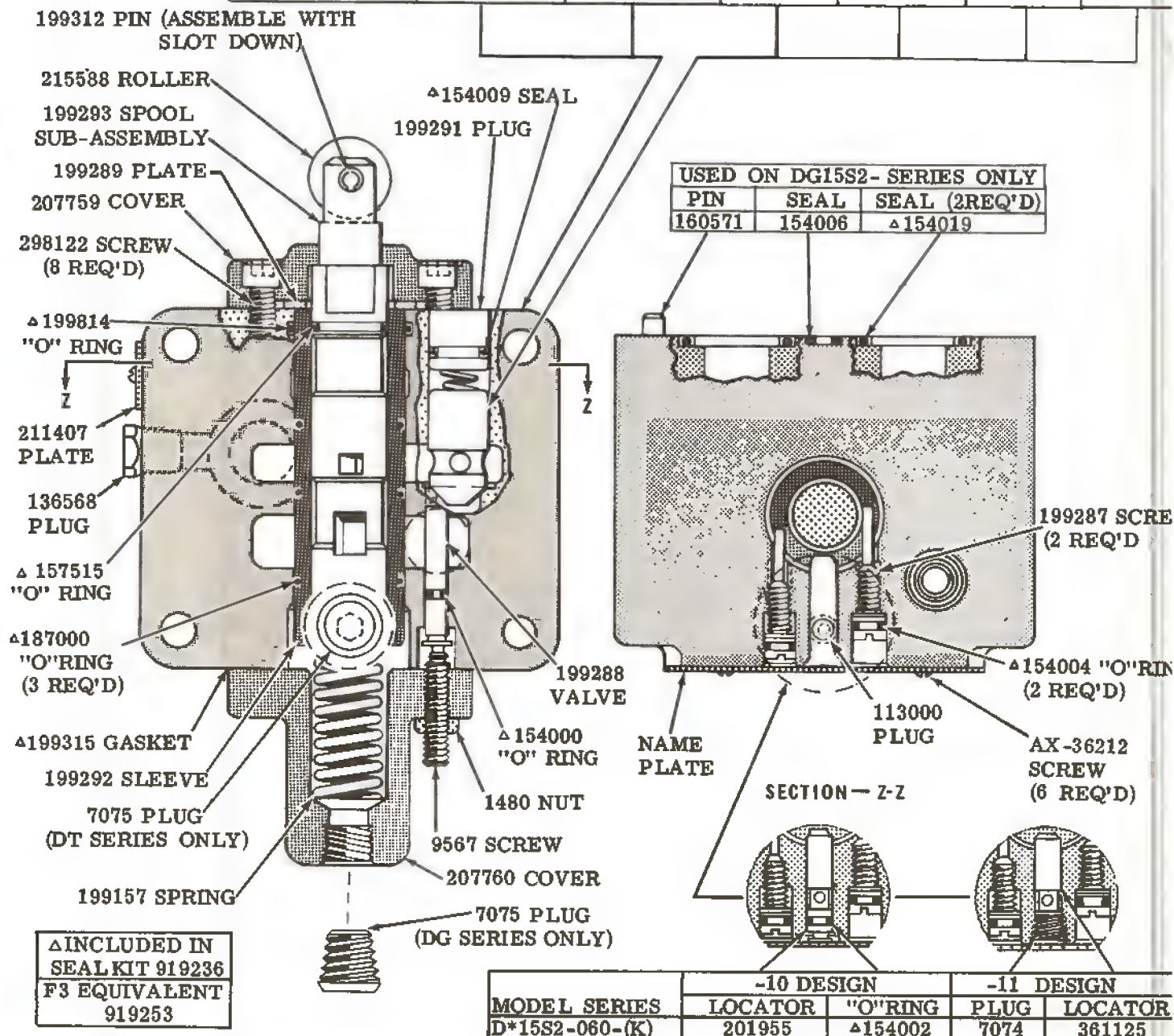
DECELERATION VALVES NORMALLY OPEN TYPE 3/4" NOMINAL PIPE SIZE

Service Parts Information

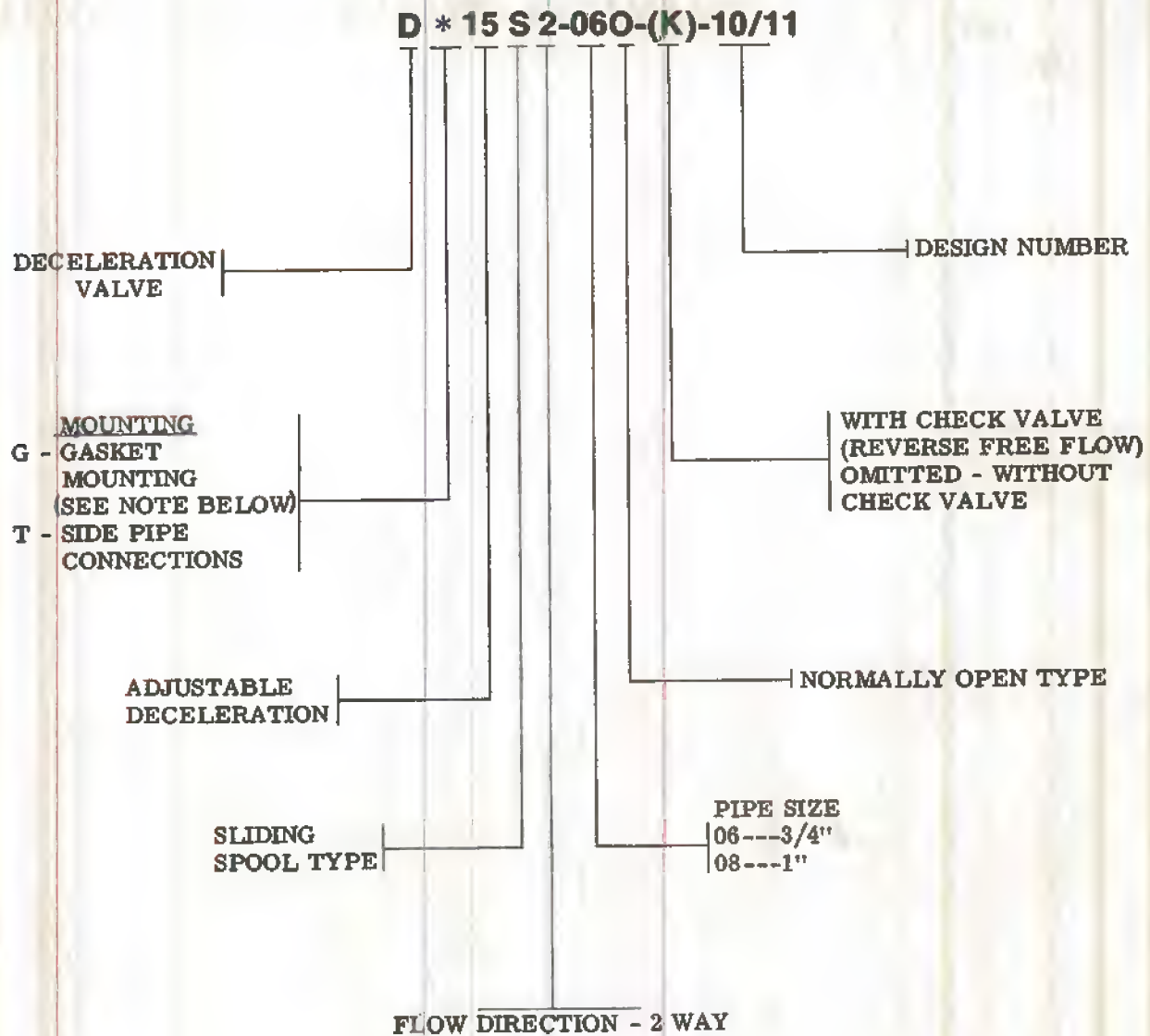
DG15S2 Series Gasket Mounted

DT15S2 Series Side Pipe Thd. Conn.

MODEL SERIES	BODY -10 DESIGN	BODY -11 DESIGN	POPPET	SPRING	PLUG	SEAL
DG15S2-060-K	207761	361130	118-X	20636	—	—
DT15S2-060-K	207764	361131				
DG15S2-060	207761	361130	—	—	211768	Δ154006
DT15S2-060	207764	361131				



MODEL CODE BREAKDOWN



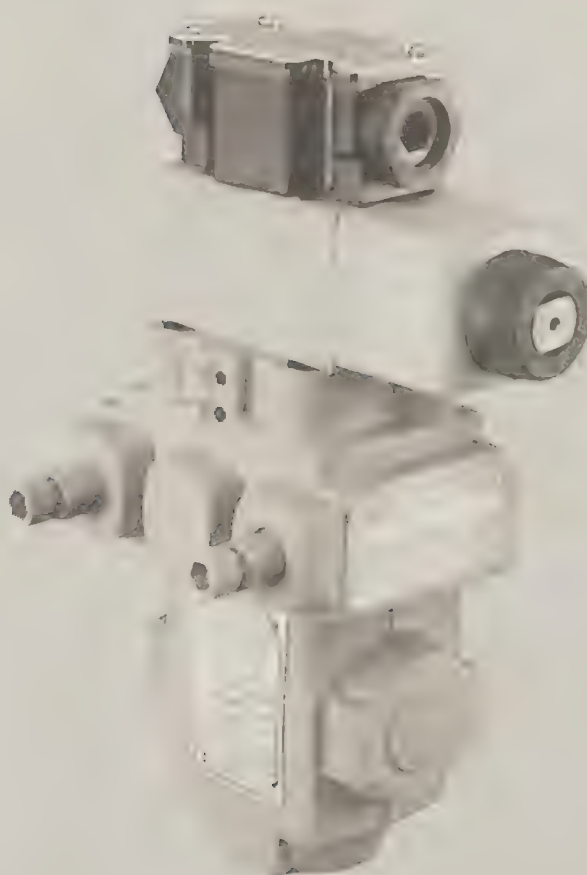
NOTE: MOUNTING SUB-PLATES FOR THE GASKET MOUNTED SERIES:		
SUB-PLATE	PORT SIZE	BOLT KIT
DG15SM-06-10	3/4" NPT	BKDG15-06-627
DG15M-08-10	1" NPT	CONSISTS OF 4 1078-A SCREWS

For satisfactory service life of these components in industrial applications, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from Vickers OFF, OFR, and OFRS series are recommended.

Litho In U. S. A.

Multi-Pressure Relief Valves

(F3)-C/G/S/T-06/10**(V)-DG-OA(L)**-(V)M-(S*)***** (L)*****-40/50



Vickers Incorporated
A TRINOVA Company
5445 Corporate Drive
P. O. Box 302
Troy, Michigan 48007-0302
U.S.A.

Released 07-01-91

I-3782-S

NOTE: Lubricate all parts & seals with a thin coat of oil at assembly.

WARNING

Use only a DG4V3(S)-OA-60 or DG4V3(S)-OAL-60 directional valve as a pilot for this relief valve. Use of a different pilot can block relief valve, causing excessive system pressure.

DG4V3(S)-OA(L)-60 Pilot valve (Refer to parts drawing for detailed information).

255698 Bolt kit (Torque 4.5–5.6 N.m.)
40–50 lb.in. (Pilot valve to adapter plate mounting) Not shown

255651 Bolt kit (Torque 14.9–20.3 N.m.)
11–15 lb.ft. (Adapter plate to cover mounting)

422814 Adapter plate

▲ 113000 Plug (4 Req'd)

▲▲ 262334 "O"Ring (4 Req'd)

○● Cover (see table)

○● 290057 Piston (2 Req'd)

○● Cover spring (see table)

○●▲▲ 262332 "O"Ring (2 Req'd)

○●▲▲ 197570 BU-Ring (2 Req'd)

○● 370701 Plunger (2 Req'd)

○● *▲ 292230 ADJ. screw (2 Req'd)

○● *▲ 1485 Locknut (2 Req'd)

○● *▲ 283949 Lockscrew (2 Req'd)

○● □▲ 64520 Washer (As req'd)

○● □▲ 326317 Washer (As req'd)

○●▲▲ 263497 "O"Ring (2 Req'd)

○●▲ 329463 Plug (3 Req'd)
Torque 52.8–58.3 N.m.
(39–43 lb. ft.)

○ 294656 Restrictor plug (2 Req'd) C*-10 only

○● 285601 Seat (2 Req'd)
Assemble cross hole facing up

▲ 226816 Rollpin

Lockwasher (see table)

Screw (see table)

▲ 113000 Plug (C*-06 5 Req'd)
○ (C*-10 7 Req'd)

○● 370839 Warning plate

○●▲ 227405 Screw (4 Req'd)

Hi-Vent spring (C*-10) See table
Lo-Vent spring (C*-06/10) See table

Hi-Vent spring (C*-06 only) See table

Hydrocone (see table)

Seat (see table)

▲▲ 262361 "O"Ring (C*-06)
262367 "O"Ring (C*-10)

* NOTE: Coat 292230 ADJ. screw, 283949 lockscrew and 1485 locknut with oil prior to assembly.

□ NOTE: These parts used at final test to obtain correct pressure range.

NOTE:

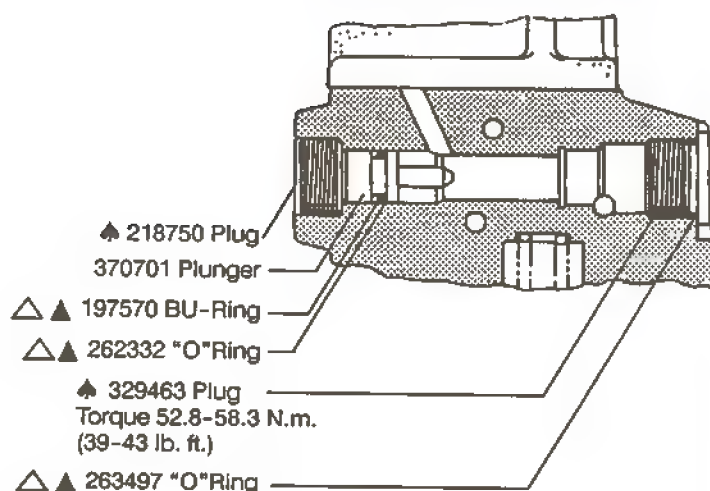
For satisfactory service life of these components in industrial applications, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. OFP, OFR, and OFRS series filters are recommended.

Model	Seat	Hydrocone	Lo-Vent spring	Hi-Vent spring	Cover
C*-06	343153	343154	2077	184458	● 370666
C*-10	283954	283952	291822	291821	○ 370671

NOTE: Use either a Lo-Vent or Hi-Vent spring. Do not use both.
(See model code)

Model	Screw (4 Req'd)	Torque		Lock washer (4 Req'd)
		lb. ft.	N.m.	
C*-06	1036	11-15	14.9-20.3	68907
C*-10	1076	35-43	47.5-58.3	68909

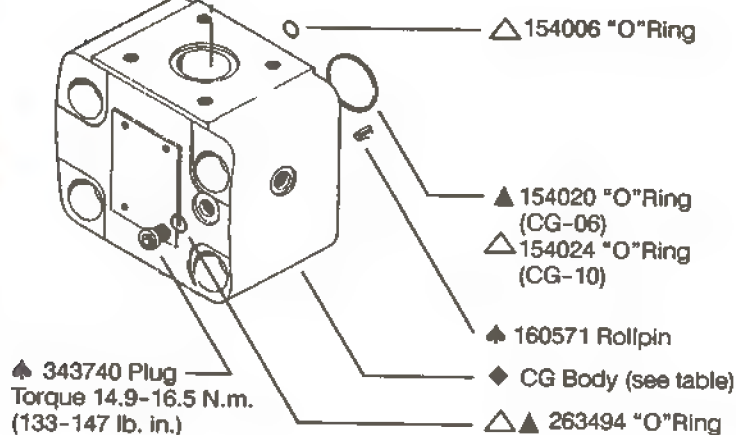
Sectional "E" vent head 1 or 3



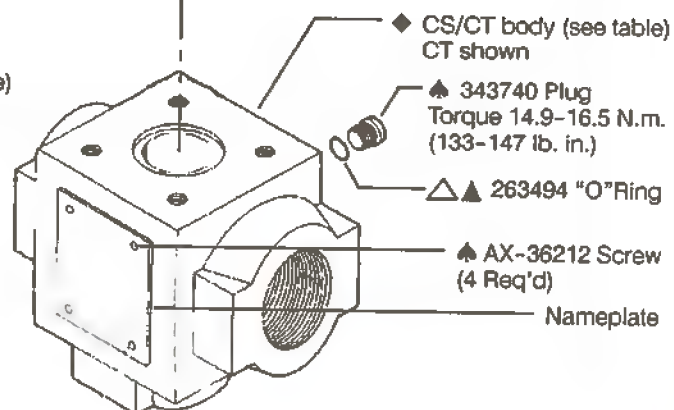
Model	Cover spring	Pressure range psi (bar)
C*-**-B	2280	125-1000 (8.5-70)
C*-**-C	583937	500-2000 (35-140)
C*-**-F	2281	1500-3000 (105-210)

♣ Part	Kit
1485	944064
AX-36212	944053
64520	944068
113000	944055
160571	944069
218750	944070
226816	944071
227405	944074
292230	944072
326317	944073
329463	944041
343740	944038

Parts with ♣ available only in kits of 25.
Reference kit on parts order.



Model	◆ Body	
	-06	-10
CG	580456	581703
CS	581701	580430
CT	590348	590300



- ▲ Included in -06 F3 seal kit 919684
- ▲ Included in -10 F3 seal kit 919685
- Included in CT-06-BC cover kit 942155
- Included in CT-10-BC cover kit 942156
- ♣ Available only in kits of 25.
- ◆ Not available for sale

Model Code

(F3)	-	C	*	*	*	(*)	(V)	-	DG	-	*	(L)	*	*	(V)	M	-	(S*)	-	*	*	*	-	*	(L)	-	*	*	*	*	-	*	*	-	EN	*	*
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22																

1 Seals for mineral oil & fire resistant fluids

2 Relief valve connections

G - Subplate mounting
S - Straight threads
T - NPTF threads

3 Valve size

06 - 3/4"
10 - 1-1/4"

4 Pressure range

B - 125-1000 psi
C - 500-2000 psi
F - 1500-3000 psi
E - Vent

5 High vent

Blank - Omit for low vent models

6 Directional valve

7 Spool type & spring arrangement

0A(L) - Spring offset

8 Left hand build

Omit for standard models

9 Manual override options (included in pilot valve model code)

Blank - Plain override solenoid ends only
H - Waterproof override solenoid ends only
H2 - Waterproof override both ends of single solenoid
M - Serviceable manual overrides in solenoid ends only
P2 - Plain override both ends of single solenoid
Y - Lockable manual overrides solenoid ends only
Z - No overrides in either end

10 Solenoid energization identity

Blank - Standard arrangement for ANSI B93.9 (energise solenoid A for flow P to A port)

V - Solenoid identification determined by position of solenoid. (Solenoid A at port A end and/or solenoid B at port B end. (All 4 & 8 spools are always V code)

11 Flag symbol heading electrical options & features

12 Spool position monitoring switch (tank pressure rating 10 bar only)

S1 - Switch, normally open, U coils only
S2 - Switch, normally closed, U coils only
S3 - Switch, wired normally open, P*
S4 - Switch, wired normally closed, P*
S5 - Switch, free leads, FW & FJ only
Omit if not required

13 Coil type

U - ISO 4400
P - Plug in coil
F - Flying lead
SP1 - Single 6,3 series spade to IEC 760
SP2 - Dual 6,3 series spade to IEC 760

14 Electrical connections (F type coil only) omit if not required

T - Wired terminal block
PA - Instaplug male receptacle only
PB - Instaplug male & female receptacle
PA3 - Three pin connector & terminal block
PA5 - Five pin connector & terminal block

15 Housing (F type coils only)

W - 1/2 NPT thread wiring housing
J - 20 mm thread wiring housing

16 Electrical options

1 - ISO with fitted plug, U type coils only
7 - Surge damper, P type coils only
9 - Rectifier (fast type) P type coils only
12 - Rectifier (slow type) P type coils only

17 Solenoid indicator lights (F build only) To be used with T terminal block models. (Omit if not required)

18 Coil identification

19 Pilot valve code (tank pressure rating)

2 - 10 bar (145 psi) use with switch models S*
5 - 100 bar (1450 psi) for all other models

20 Pilot valve port orifices

21 Design

40 - DG4V3S-60
Standard pilot valve
50 - DG4V3-60
High performance pilot valve

22 Special modifications (omit if not required)

7 Thru **20** included in pilot valve model code

VICKERS®
A TRINITY COMPANY

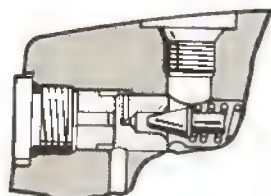
Service Parts Information

VICKERS

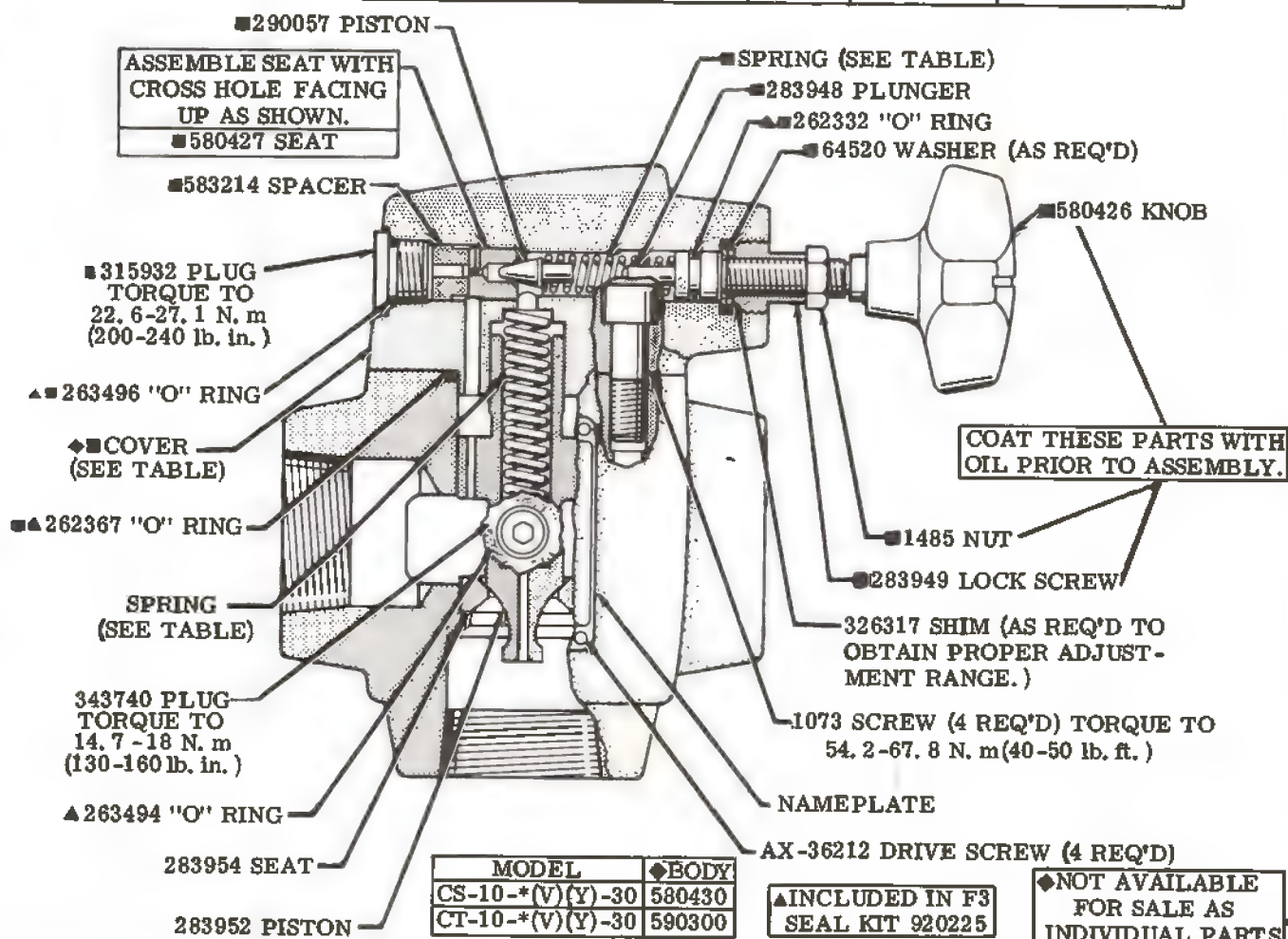
A TRIMONA COMPANY

BALANCED PISTON TYPE RELIEF VALVES

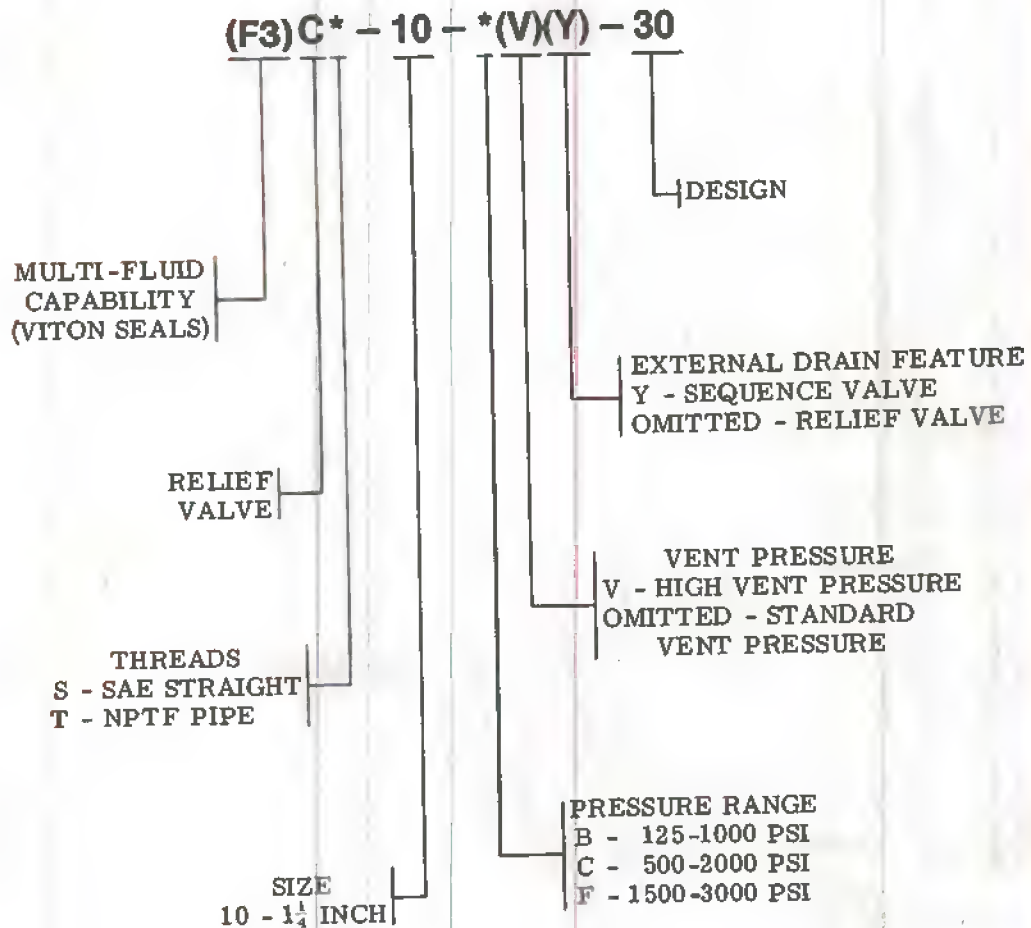
(F3)C*-10-*(V)(Y)-30


 "Y" COVER ASSEMBLY
(SEE TABLE)

MODEL	COVER	SPRING	SPRING	PRESSURE RANGE PSI	INCLUDED IN COVER S/A
C*-10-B-30	581700	291822	2280	125-1000	941286
C*-10-BV-30		291821			
C*-10-BVY-30		590304			
C*-10-BY-30	581700	291822	583937	500-2000	941287
C*-10-C-30		291821			
C*-10-CV-30		590304			
C*-10-CY-30	581700	291822	2281	1500-3000	941288
C*-10-F-30		291821			
C*-10-FV-30		590304			
C*-10-FY-30		291822			926596



MODEL CODE BREAKDOWN

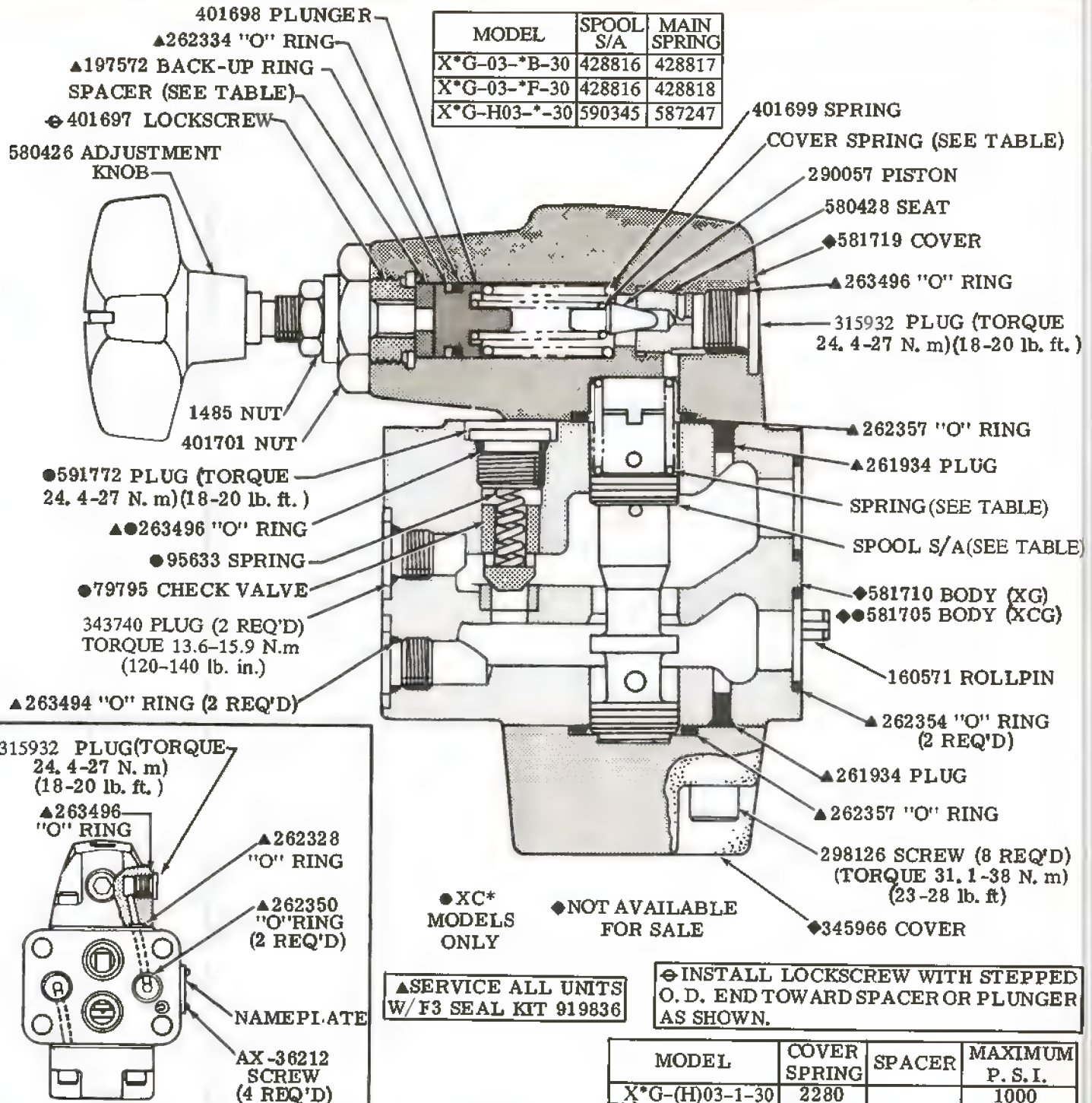


For satisfactory service life of these components, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from Vickers OFF, OFR, and OFRS series are recommended.

Service Parts Information

PRESSURE REDUCING VALVES

X(C)G-(H)03-**-30



MODEL	COVER SPRING	SPACER	MAXIMUM P.S.I.
X*G-(H)03-1-30	2280	—	1000
X*G-(H)03-2-30	583937	—	2000
X*G-(H)03-3-30	401700	386715	2850

Vickers, Incorporated
1401 Crooks Road
Troy, Michigan 48064

Revised 12-1-87

I-3664-S

MODEL CODE BREAKDOWN

(F3) - X (C) G - (H) 03 - * * - 30
 1 2 3 4 5 6 7 8 9

1 Seals For Mineral Oil
& Fire Resistant Fluids

6 Nominal Valve Size - 3/8 Inch

2 Pressure Reducing Valve

7 Maximum Adjustable Pressure

1 - 1000 PSI

2 - 2000 PSI

3 - 2850 PSI

3 Integral Check Valve
(Omit if not Required)

8 Rated Flow
(Omit for High Flow 'H' Models)

B - 7 USGPM

F - 14 USGPM

4 Manifold or Subplate Mounted

5 Rated Flow - 30 USGPM
(Omit for 'B' & 'F' Models)

9 Design

For satisfactory service life of these components in industrial applications, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from OFF, OFR, and OFRS series filters are recommended.

Litho In U.S.A.

Service Parts Information



OIL PILOT OPERATED MINIATURE 4-WAY DIRECTIONAL VALVE

DG3V-3-**(L)-40

* AVAILABLE LOT KITS (25 PCS.)	
PART #	KIT #
468641	944012
472553	944008
627800	944001
631769	944014
676273	944013
681620	944015

468641 SCREW (2 REQ'D)*
TORQUE 0.5-0.7 N.M
(4-6 lb. in.)

989583 WASHER (2 REQ'D)

989585 LABEL CARRIER

NAMEPLATE LABEL
(REFER TO DRAWING
J-685777)

631604 BODY (NOT
AVAILABLE FOR SALE)

■ SPOOL (SEE TABLE)

■ 926533 DETENT S/A
(USE ON "N"
MODELS ONLY)

472553 ROLL PIN

■ 262332 "O" RING (4 REQ'D)

■ 681620 WASHER* (USE ON "C" &
"F" MODELS ONLY) (ASSEMBLE
ROUNDED FACE TOWARDS SPOOL)

■ 627800 WASHER* (USE ON
"BLANK, "A" & "B"
MODELS ONLY)

■ 688769 SPRING (OMIT AT THIS
END ON "F" MODELS ONLY)

■ 262336 "O" RING

676269 END CAP
(TORQUE 17.0-28.0 N.m
150-250 lb. in.)

R. H. ASSEMBLY SHOWN, FOR ALL
SINGLE OPERATOR MODELS. FOR
L. H. ASSEMBLY, ALL PARTS ARE
REVERSED EXCEPT BODY FOR "A"
MODELS, OR BODY & SPOOL FOR
"B" & "F" MODELS

PARTS PREFIXED WITH
SYMBOL AVAILABLE
ONLY IN KITS.

676269 END CAP
(TORQUE 17.0-28.0 N.m
150-250 lb. in.)

■ 262336 "O" RING

■ 676273 SPACER (USE ON
"A" MODELS ONLY)

■ 688769 SPRING

■ 681620 WASHER* (USE ON
"B" "C" "F" MODELS ONLY)
(ASSEMBLE NEXT TO SPRING
WITH ROUNDED FACE TO-
WARDS SPOOL)

■ 631769 SPACER* ("F" MODELS
ONLY) (ASSEMBLE NEXT
TO SPOOL)

■ 627800 WASHER* (USE ON
"BLANK" & "N" MODELSONLY)

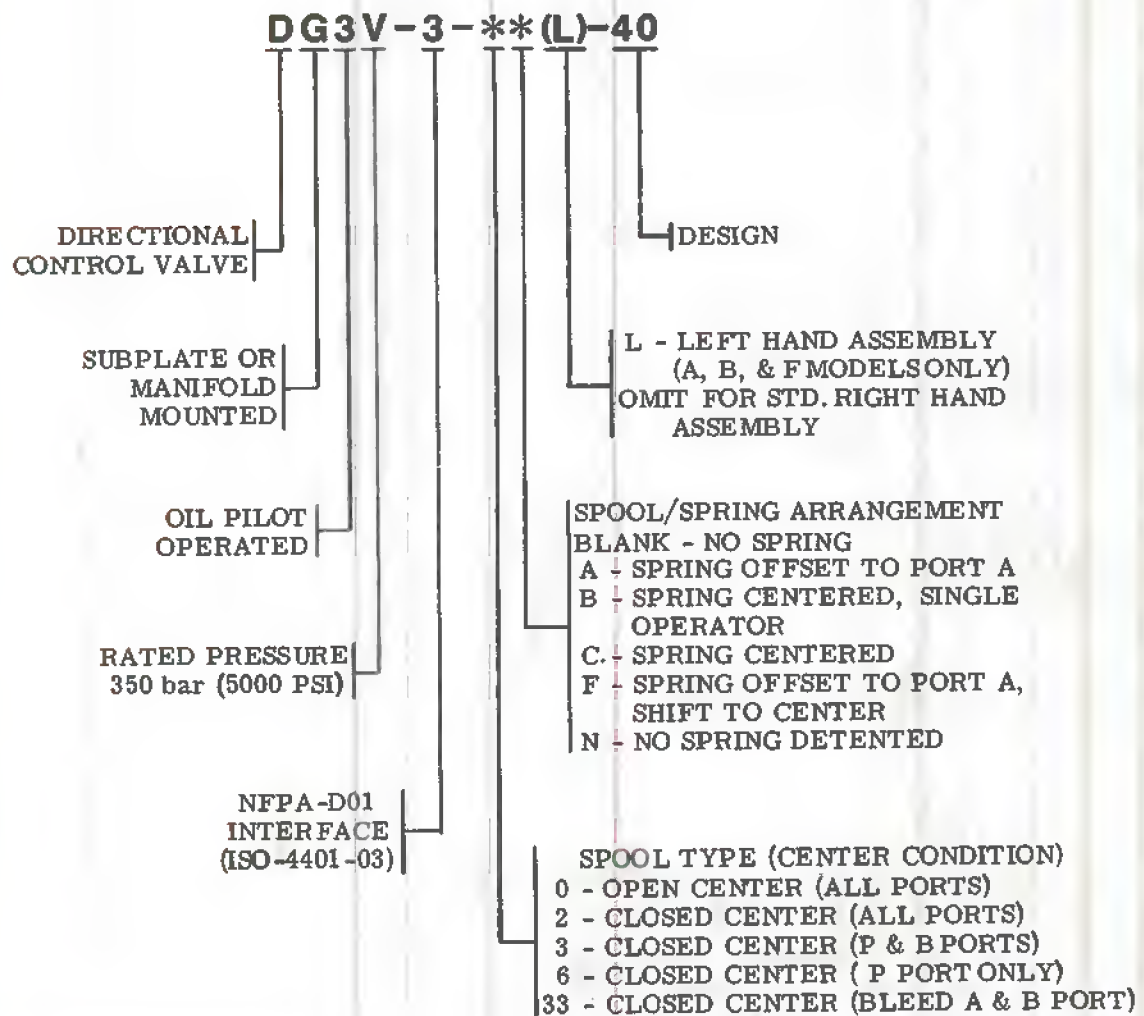
▲ INCLUDED IN
920332 SEAL KIT

■ INCLUDED IN SPOOL
KIT (SEE TABLE)

SPOOL TYPE	SPOOL	SPOOL KIT
OA	689675	926473
OC	587129	926474
2A	681614	926475
2C	587127	926476
2N	681614	926477
3C	590501	926589
6*	681615	926478
6A	681615	926479
6N	587130	926480

ASSEMBLE TYPE 3 SPOOL
WITH NARROW CENTER
LAND TOWARDS 'A' PORT.

MODEL CODE BREAKDOWN



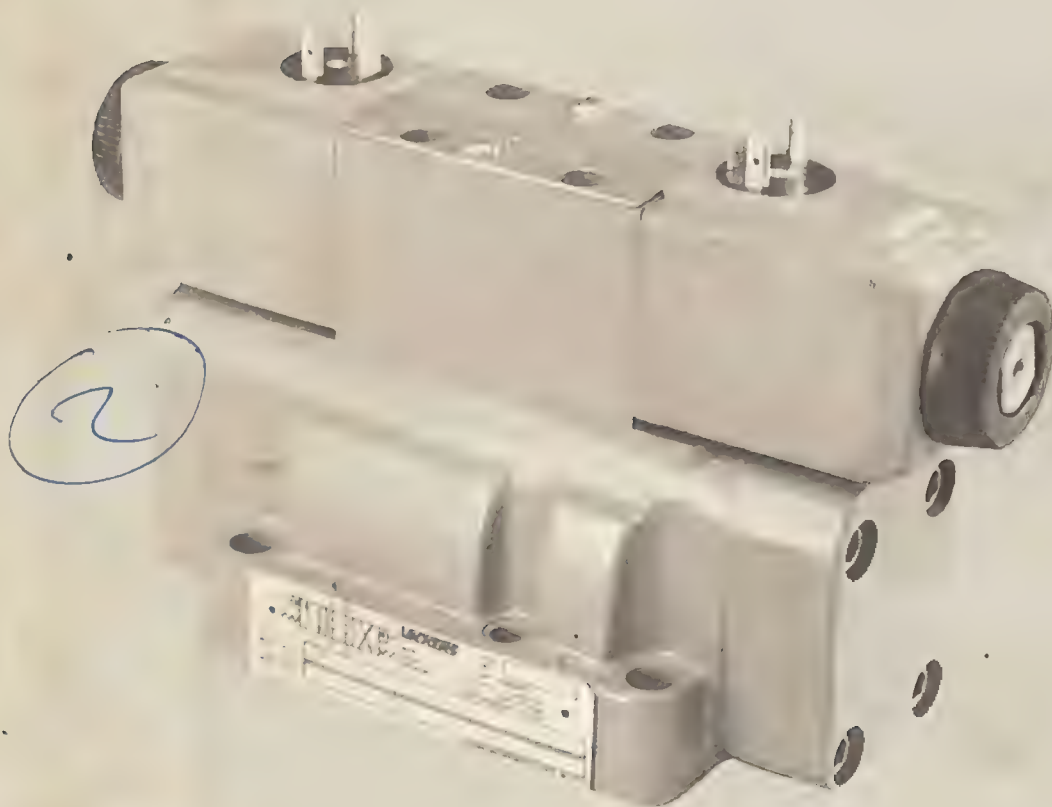
AS THIS COMPLETE UNIT CAN BE REPLACED AT A NOMINAL COST, FACTORY REPAIR IS NOT PRACTICAL. KITS ARE AVAILABLE TO SUPPORT CUSTOMER REPAIR.

For satisfactory service life of these components, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from OFP, OFR and OFRS filter series are recommended.

Litho in U. S. A.

Solenoid Controlled Pilot Operated Directional Valves

(F3)DG5S4-04-**(L)**(X*)(E)(T)(*)-(V)M-(S*)**(**)**(L)**5-***-60/70



Vickers Incorporated
A TRINOVA Company
5445 Corporate Drive
P. O. Box 302
Troy, Michigan 48007-0302
U.S.A.

MAIN STAGE SPOOL TYPE	AVAILABLE VALVE TYPE	SPOOL	MAIN STAGE ID PLATE	
			"A" ONLY	B/C/N
0	A/B/C/N	399891	433851	433852
1		*431972		433851
2		399892		433853
3		*399893		433854
4		413481		433855
6		399894		433856
8		399896		433855
9		413483		433852
11		*431972		433851
31		*399893		433851
33		399897		433856

*** SPOOL ASSEMBLY NOTE**

Assemble type 1 & 3 spools with narrow center land toward "A" end of valve. "A" end is defined as being closest to CYL. port "A". Type 11 & 31 spools are installed in reverse of type 1 & 3 with narrow center lands toward "B" end of valve.

■ PLUG TORQUES (OILED)

PLUG	N.M	lb. in.
7074	8.5-9.6	75-85
113000	5.0-5.9	45-52
367427	5.0-5.9	45-52

■ PLUG INSTALLATION TABLE

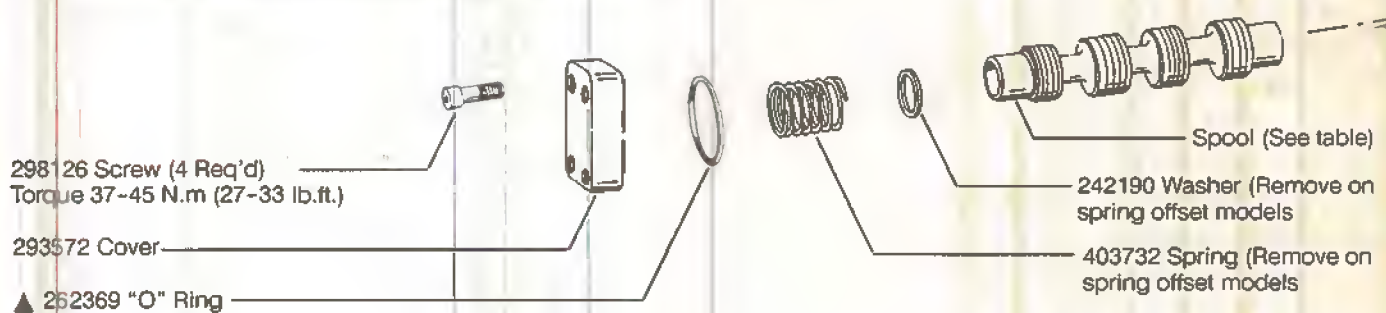
MODEL	"A" PLUG	"B" PLUG	"C" PLUG
DG5S4-04*	DOES NOT EXIST	367427	OUT
DG5S4-04*-E		113000	367427
DG5S4-04*-X		OUT	OUT
DG5S4-04*-X-E		113000	
DG5S4-04*-K/R/S	367427		
DG5S4-04*-E-K/R/S	113000		326427
DG5S4-04*-X-K/R/S	OUT		OUT
DG5S4-04*-X-E-K/R/S	113000		

★ 113000 SOLID PLUG

★ 367427 ORIFICE PLUG

NOTE

Parts included in service kits are not sold separately.



VALVE MODEL CODE	MAIN STAGE SPOOL TYPE	PILOT VALVE MODEL CODE
DG5S4-04*A	O, 1, 2, 3, 6, 9, 11, 31, 33	DG4V-3(S)-2A-60
	4 & 8	DG4V-3(S)-28A-60
DG5S4-04*B	O, 1, 2, 3, 6, 9, 11, 31, 33	DG4V-3(S)-6B-60
	4 & 8	DG4V-3(S)-68B-60
DG5S4-04*C	O, 1, 2, 3, 6, 9, 11, 31, 33, 52, 521	DG4V-3(S)-6C-60
	4 & 8	DG4V-3(S)-68C-60
DG5S4-04*N	O, 1, 2, 3, 6, 9, 11, 31, 33	DG4V-3(S)-6N-60
	4 & 8	DG4V-3(S)-68N-60

See pilot valve service drawing for parts breakdown

- ▲ Included In F3 Seal Kit 696897
- ★ Included In Plug Kit 926545
- ◆ Not Available For Sale
- ♣ Used On Check Valve Models Only
- Plug Torques (See Table)
- Available Only In Kit Of 25 Each

MODEL	▲ SPRING
DG5S4-04-K	426859
DG5S4-04-R	418675
DG5S4-04-S	432350

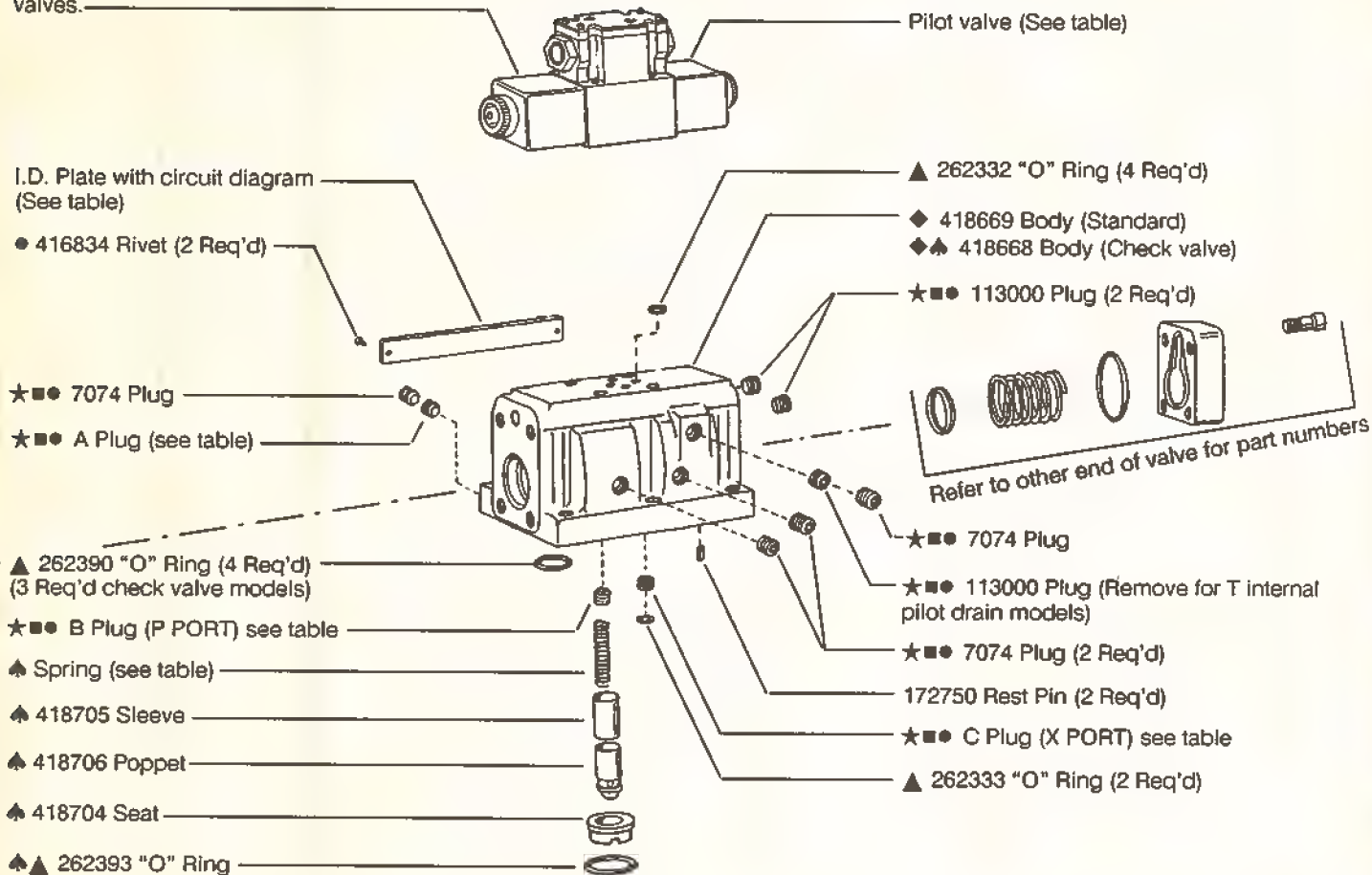
This solenoid removed on right hand A, & B, models. Refer to service drawings for more detailed information on left hand valves.

PILOT STAGE BOLT KIT (INCLUDES 4 ATTACHING BOLTS)

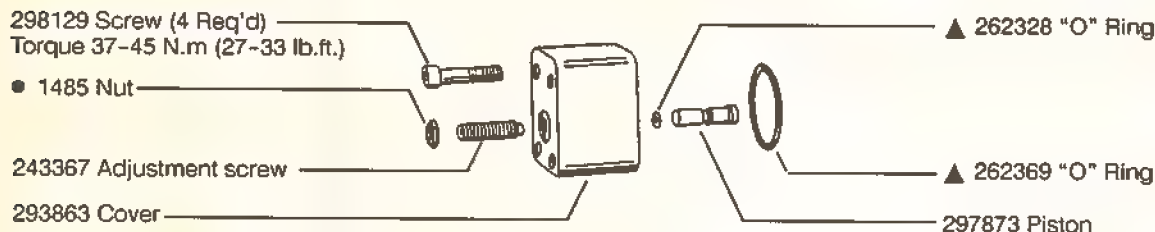
MODEL	BOLT KIT
W/O Pilot choke	696899
W/ Pilot choke	696900

Torque 4.5-5.7 N. m. (39.8-50.4 lb. in.)

See pilot choke service drawing for parts breakdown



Parts shown included in 941029 stroke adjustment kit. Order two kits if stroke adjustment is required for both ends.

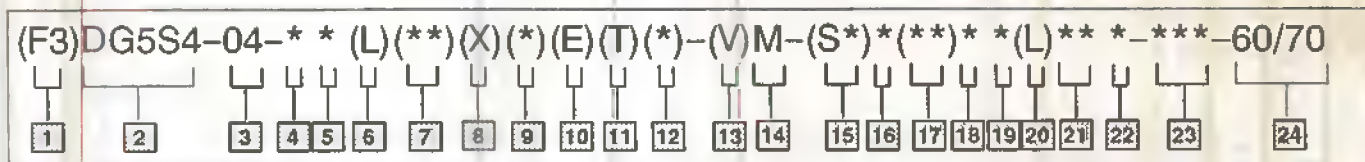


Stroke adjustment parts either end or both

NOTE

For satisfactory service life of these components in industrial applications, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner.

Model Code



- 1** Seals for mineral oil & fire resistant fluids
- 2** Directional control valve
Manifold or subplate mounted
Solenoid controlled
Pilot operated
Rated pressure 210 bar (3000 psi)

- 3** Interface
04 - NFPA-D04 (ISO-4401-07)

- 4** Spool type (see table)

- 5** Spool/Spring arrangement
A - Spring offset, to CYL. A
B - Spring centered, sol. A removed
C - Spring centered
F - Spring offset, to CYL. A shift to center
N - No spring detented

- 6** Left hand
L - Left hand (single solenoid only)
Blank - Omit when not required

- 7** Manual override option
Blank - Plain override solenoid ends only
H - Waterproof override solenoid ends only
H2 - Waterproof override both ends of single solenoid
P2 - Plain override both ends of single solenoid
Y - Lockable manual overrides solenoid ends only/DC only
Z - No overrides in either end

- 8** Response type
X - Fast response
Blank - Standard low shock models

- 9** Spool control modifications
1 - Stroke adjustment
2 - Pilot choke adjustment
3 - Pilot choke & stroke adjustment
7 - Stroke adjustment CYL. A only
8 - Stroke adjustment CYL. B only
2-7 - Dual pilot choke & stroke ADJ. A port end only
2-8 - Dual pilot choke & stroke ADJ. B port end only
Blank - Omit when not required

- 10** Pilot pressure
E - External pilot pressure
Omit - Internal pilot pressure

- 11** Pilot drain
T - Internal pilot Drain
Omit - External pilot drain

- 12** Pressure port check valve
K - 0.35 bar (5 psi cracking pressure)
R - 3.45 bar (50 psi cracking pressure)
S - 5.20 bar (75 psi cracking pressure)
Blank - Omit when not required

- 13** Solenoid energization identity
Blank - Standard arrangement for ANSI B93.9 (energize solenoid A for flow P to A port)
V - Solenoid identification determined by position of solenoid. (Solenoid A at port A end and/or solenoid B at port B end. (All 4 & 8 spools are always V code)

- 14** Flag symbol heading electrical options & features

- 15** Spool indicator switch
Available on high performance models, DG4V-3, only.
Omit when not required.
S1 - Options available on U only)
S2 - Options available on U only)
S3 - Options available on P* only
S4 - Options available on P* only
S5 - Options available on FW/FJ only

- 16** Coil type
U - ISO 44C0
F - Flying lead
SP1 - Single 6,3 MM spade to IEC 760
SP2 - Dual 6,3 MM spade to IEC 760

- 17** Electrical connections (F type coil only) omit if not required
T - Wired terminal block
PA - Instaplug male receptacle only
PB - Instaplug male & female receptacle
PA3 - Three pin connector
PA5 - Five pin connector

- 18** Housing (F type coils only)
W - 1/2 NPT thread wiring housing
J - 20 mm thread wiring housing

- 19** Electrical options
1 - ISO with fitted plug, U type coils only
6 - ISO with fitted plug, & lights
U type coils only

- 20** Solenoid indicator lights (F build only) used with T terminal block models. (Omit if not required)

- 21** Coil identification

- 22** Pilot valve code (tank pressure rating)
2 - 10 bar (145 psi) DG4V3-60
5 - 100 bar (1450 psi) DG4V3S-60
6 - 160 bar (2285 psi) DG4V3-60
7 - 210 bar (3000 psi) DG4V3-60

- 23** Pilot valve port orifices

- 24** Design
60 - DG4V3S-60 pilot valve
70 - DG4V3-60 pilot valve

6 Thru **23** included in pilot valve model code

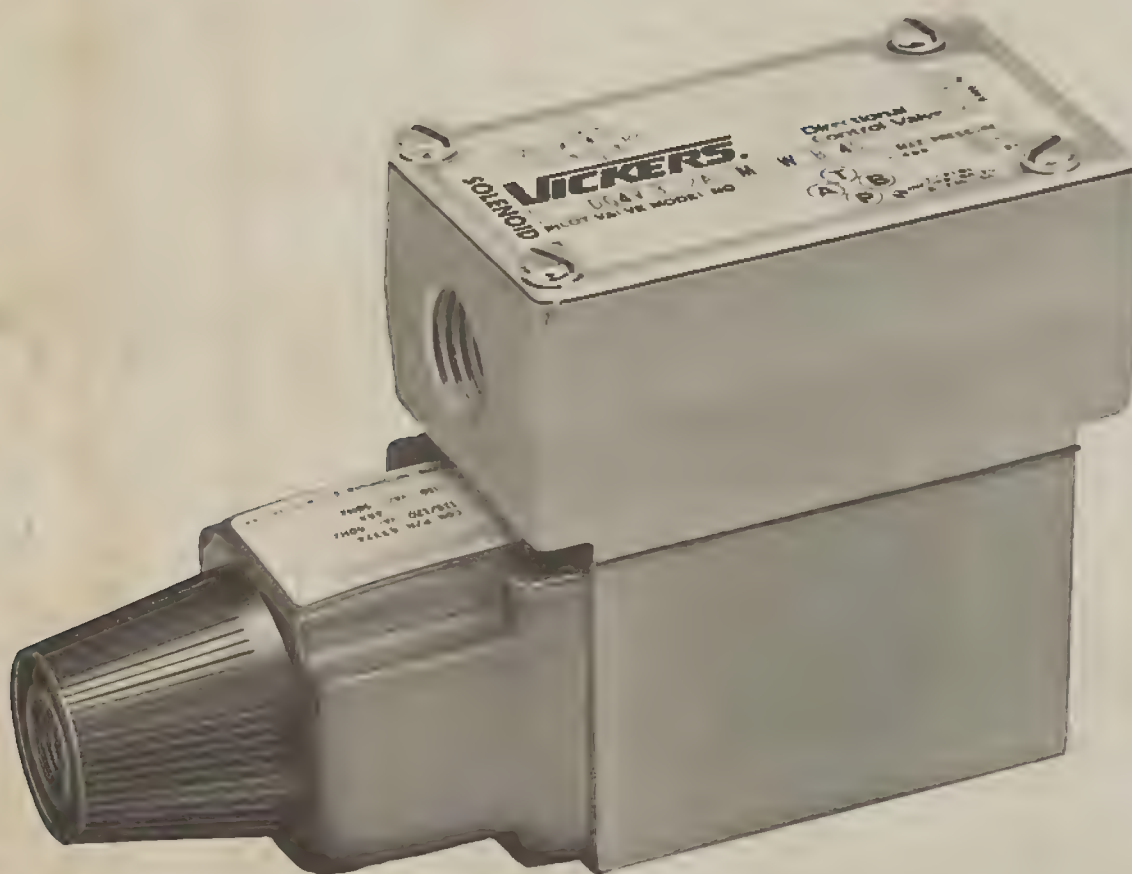
VICKERS®
A TRIMONA COMPANY

Service Parts Information

**Solenoid
Operated
Directional
Valve**

DG4V-3-*A-M(P**)-**-*-40 Spring Offset

①



Vickers, Incorporated

1401 Crooks Road
Troy, Michigan 48064

Revised 8-1-86

I-3861-S

127

DIN 43650 COIL S/A	COIL S/A	AC VOLT Hz	DC VOLT	COIL CODE
635061	633741	110/50, 115/60, 120/60		B
683312	989721	110/50, 115/60, 120/60		*B-9
635062	633742	220/50, 230/60, 240/60		D
683218	989764	24/50, 24/60		N
683310	683053	100/50, 100/60		T
681611	681404		32	DK
681423	989654		12	G
681610	989656		24	H
682552	682550		48	J

*B-9 REDUCED POWER CONSUMPTION COIL

SPOOL TYPE	SPOOL	SPOOL KIT
0A	989594	926350
2/28A	631615	926351
6A	989595	926352
7A	989596	926353
22A	989649	926354

SPOOL KIT ALSO INCLUDES PARTS PREFIXED WITH ▲ AND ■.

REFER TO I-3866-S
FOR ELECTRICAL
FEATURES AND
OPTIONS

- ▲ INCLUDED IN F3 SEAL KIT 920304
- ◆ INCLUDED IN FASTENER KIT 926433
- ◆ INCLUDED IN MANUAL OVERRIDE KIT 926462
- ✱ AVAILABLE ONLY IN KITS OF 25
- OMIT WHEN USING DIN 43650 COILS

●▲633746 GASKET/
RETAINER

●◆36212 SCREW

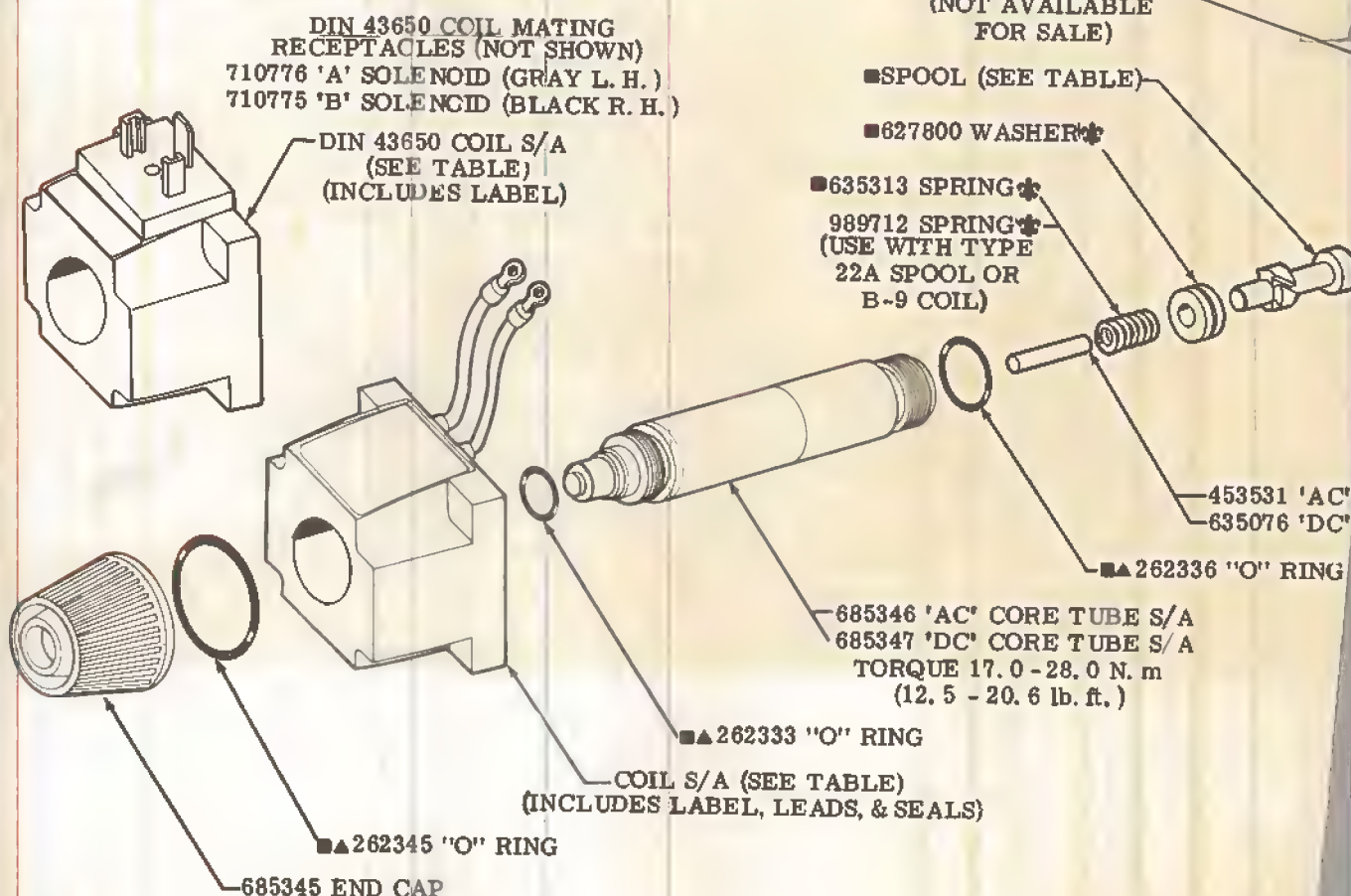
●630855
TERMINAL
BOX

-A SPOOL DESIGNATION OF 28A INDICATES VALVE IS USED AS A PILOT FOR TWO STAGE VALVES WITH 4 OR 8 TYPE MAIN STAGE SPOOLS. REFER TO DWGS. J-682451 & J-685777 FOR NAMEPLATE.

-ASSEMBLE TYPE 0A SPOOL WITH LONGER SPOOL END TOWARDS SOLENOID.
-ASSEMBLE TYPE 7A SPOOL WITH REDUCED AND UNSLOTTED END DIA. TOWARDS SOLENOID.

PARTS WITH SYMBOLS
AVAILABLE ONLY
IN KITS

●▲635069 GASKET



SCREW (METRIC)	
◆ STD (4 REQ'D)	DIN 43650 (2 REQ'D)
422004	468641
TORQUE 0.5-0.7 N.m (4.5 - 6.2 lb. in.)	

DG4V-3-*A-M(P**)-***-40

989583 SEAL (2 REQ'D)
(NOT SHOWN) (WHEN USING
468641 SCREW FOR
DIN 43650 MODELS)

635067 CARRIER (STD MODELS)
989585 CARRIER (DIN 43650)

NAMEPLATE LABEL
(STD MODELS REFER TO DWG. J-682451)
(DIN 43650 REFER TO DWG. J-685777)

◆◆ 688457 SCREW (2 REQ'D)
(TORQUE 2.3 - 2.8 N.m)
(20.3 - 24.8 lb. in.)
(METRIC)

◆◆ 576915 SCREW

■▲ 676560 PLUG

■ 635313 SPRING
989712 SPRING
(USE WITH TYPE
22A SPOOL OR
B-9 COIL)

472553 ROLL PIN

RESTRICTOR PLUG
(OPTIONAL) (SEE TABLE)

■▲ 262332 "O" RING (4 REQ'D)

634235 END CAP
(TORQUE 17.0-28.0 N.m)
(12.5 - 20.6 lb. ft.)

■▲ 262336 "O" RING

"P" FEATURE
MANUAL OVERRIDE

◆■▲ 262

RESTRICTOR		
PART	ORIFICE	
684300	0.3	
631892	0.8	
628733	1.0	
632937	1.3	
635281	1.5	
687072	2.0	
631931	2.3	
685482	3.2	
632936	BLANK	
USE IN EITHER A, B, P, OR T I		

INGER

36 "O" RING

676270 END CAP
(TORQUE 17.0-28.0 N.m)
(12.5 - 20.6 lb. ft.)

RIGHT HAND ASSEMBLY SHOWN
EXCEPT 28A(P) FOR LEFT HAND
ASSEMBLY, ALL PARTS ARE
INTERCHANGABLE, EXCEPT BODY AND
TERMINAL BOX.

MODEL CODE BREAKDOWN

DG4V-3- * A(P)(L)-M(P)-**-*(9)-(***)-40**

DIRECTIONAL
VALVE

SUBPLATE OR
MANIFOLD
MOUNTED

SOLENOID
OPERATED

MAXIMUM
PRESSURE
RATING
350 bar
(5000 PSI)

INTERFACE
NFPA-D01/
ISO-4401-3

SPOOL TYPE

A - SPRING OFFSET
TO 'A' PORT

MANUAL OVERRIDE
(OMIT WHEN
NOT REQUIRED)

DESIGN

RESTRICTOR PLUG
(A, B, P, OR T PORT)
(SEE TABLE FOR
ORIFICE DIA. SIZES)

LOW WATTAGE COIL
(B COIL ONLY)

COIL CODE LETTER (SEE TABLE
FOR VOLTAGE AND
FREQUENCY)

U - DIN 43650 COIL
W - WIRING HOUSING ½ NPT THD.
WL - WIRING HOUSING ½ NPT THD.
(WITH INDICATOR LIGHT)

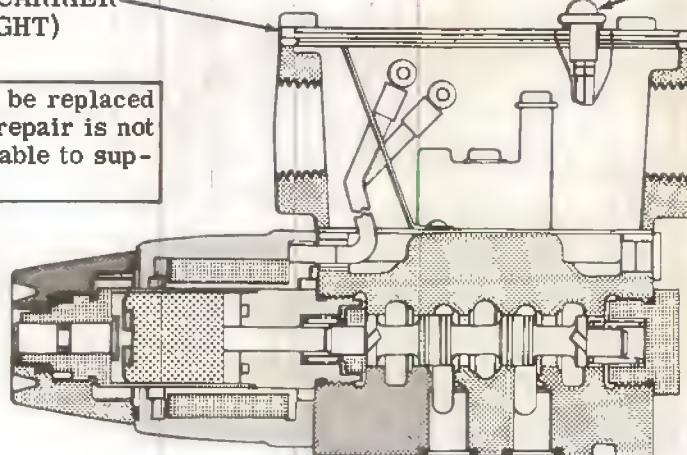
ELECTRICAL
FEATURES (REFER
TO DWG. 1-3866-S)

FLAG SYMBOL HEADING
ELECTRICAL FEATURES
AND OPTIONS

LEFT HAND (OMIT
WHEN NOT REQ'D)

635065 CARRIER
(LIGHT)

As this complete unit can be replaced
at a nominal cost, factory repair is not
practical. Kits are available to sup-
port customer repair.



LIGHT KIT	VOLTAGE RANGE
926499	12V AC/DC
926431	24V AC/DC
926432	115V AC/DC
926458	230V AC/DC

LIGHT KITS INCLUDE
TWO LIGHTS

For satisfactory service life of these components in industrial applications, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from Vickers OFP, OFR, and OFRS series are recommended.

Litho in U S. A

Power Plugs for Proportional Valves (12 volt supply)

EHH-AMP-712-D/E-1* series
EHH-AMP-712-G/H-1* series

For use with valve types:

KDG4V-3-**-C***-*(V)M-U-GP7-2*
 KTG4V-3-**-B***-*(V)M-U-GP7-2*
 KDG4V-5-**-C***-*(V)M-U-GP7-3*
 KTG4V-3-**-B***-*(V)M-U-GP7-3*
 KCG-3-***-D-Z-M-U-GP1-1*



1. General Description

These plugs, conforming to ISO 4400/DIN 43650 interface, offer low cost solutions for direct solenoid-operated, non-feedback hydraulic proportional valves through the use of an integral amplifier.

Adjustments of "gain", "ramp time" and "deadband" can be made directly at the plug. Two ranges of ramp time are offered.

The proportional plugs are controlled with 0-5V, or 0-10V command signal to give an output current (adjustable with the gain control) of up to 2,7A maximum.

Features and Benefits

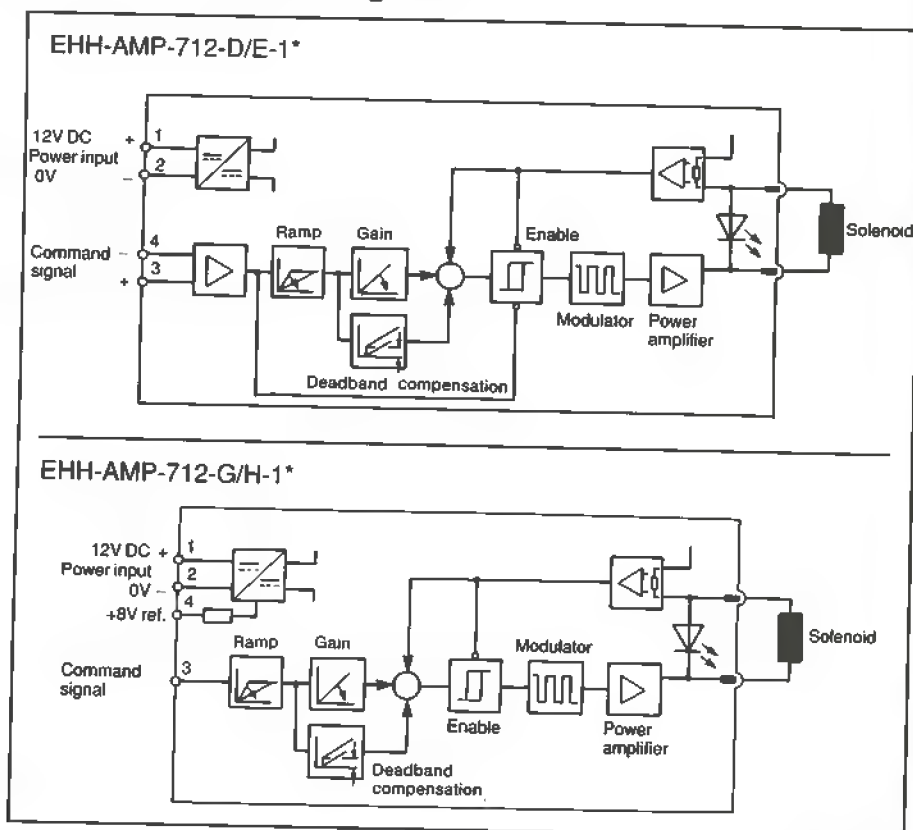
- Integral amplifier provides essential functions for control of proportional valves
- Differential command signal option (types D and E)
- 8 volt reference option (types G and H)
- Adjustable ramp time
- Adjustable deadband compensation
- Adjustable gain
- Ease of installation with reduced cost
- Reduction of EMI radiation
- Fully short-circuit and reverse polarity protected

2. Application

Primary applications are the control of directly operated, non-feedback proportional valves where the cost of sophisticated electronic controls can be avoided.

The combination of proportional valve and plug offers very low cost solutions to many hydraulic actuator control problems requiring smooth acceleration and deceleration.

3. Electrical Block Diagrams



4. Model Codes

EHH-AMP - 712 - * - 1*

1 2

1 Adjustment range

D = 10V differential input: 600 ms maximum ramp time

E = 10V differential input: 5s maximum ramp time

G = 5V input: 600 ms maximum ramp time

H = 5V input: 5s maximum ramp time

2 Design number, 1* series

Subject to change. Installation dimension unaltered for design numbers 10-19 inclusive.

5. Operating Data

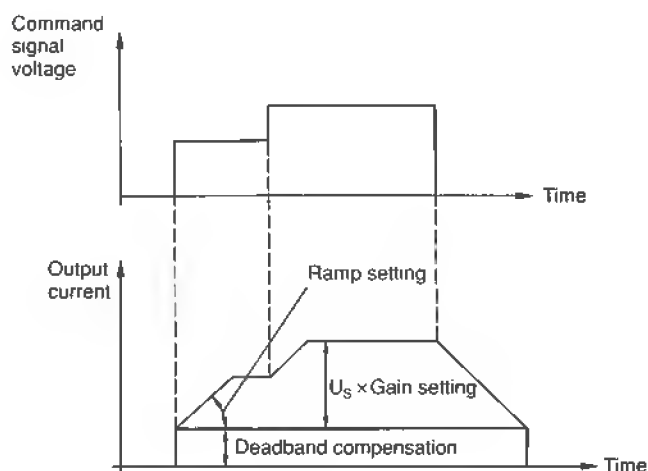
5.1 Electrical

Power supply	9,5 - 16V DC, incl. $\pm 10\%$ max. ripple peak-to-peak
Protection	IEC529: IP65 (when correctly installed with interface seal in place). Fully short-circuit and reverse-polarity protected.
Output : Rated current Cut-off current Short circuit PWM frequency Load impedance	2,7A 3A 0,1A rms typical 400 Hz typical $\leq 3\Omega$
Command signal: Types D and E: For no output For output Types G and H: For no output For output	0 to 100 mV 200 mV to 10V 0 to 100 mV 200 mV to 5V
Command signal, absolute maximum for all types	70V
Reference voltage, types G and H Output impedance Minimum load impedance	+8V $\pm 0,2V$ (open circuit) 1,3 k Ω 2,2 k Ω
Input impedance (signal): Types D and E Types G and H	47 k Ω 94 k Ω
Ramp time adjustment range (potentiometer R1): Types D and G Types E and H	50 to 600 ms 400 ms to 5s
Deadband compensation adjustment range (potentiometer R2)	0 to 1A
Deadband triggering voltage	200 mV
Gain adjustment range (potentiometer R3) Types D and E Types G and H	0,075 A/V to 0,27 A/V 0,15 A/V to 0,54 A/V

5.2 Mechanical

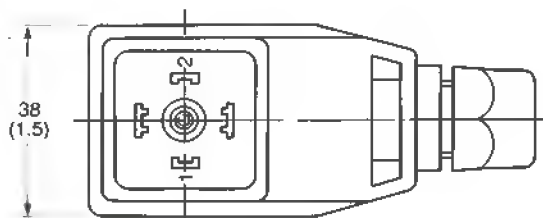
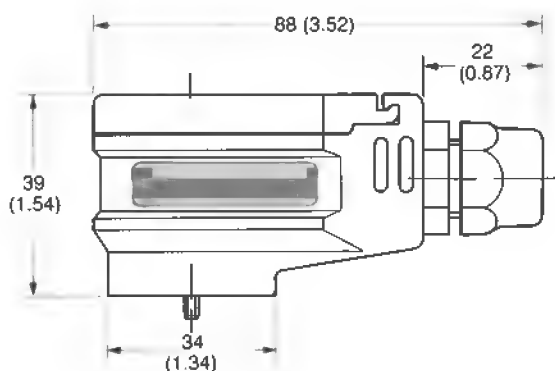
Housing	PA6 glass-reinforced plastic (conforming to UL-94HB) Color: gray
Mounting interface	ISO 4400 (DIN 43650)
Cable clamp	Pg9 screw type
Cable diameter	$\varnothing 5$ to 10 mm (0.197 to 0.394 dia)
Wire section	0,5 to 1,0 mm ² (0.001 to 0.002 in ²) (20 AWG-18 AWG)
Temperature, ambient range	0 to 50°C (+32 to 122°F)
Mass	0,07 kg (0.154 lb)

Input/output characteristics



6. Installation Dimensions in mm (inches)

3rd angle projection



7. Installation Data

Typical Installation Connections

EHH-AMP-712-D/E

Fig. 1

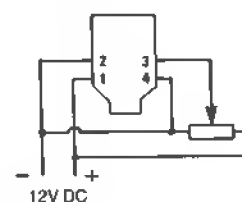


Fig. 2

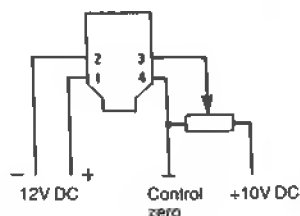


Fig. 3

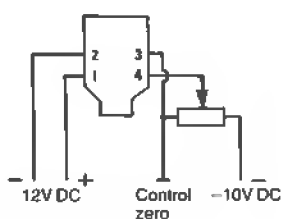
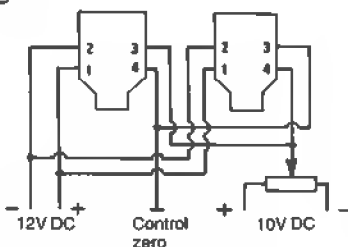


Fig. 4



Figs. 1, 2, 3 show typical arrangements for single solenoid valves

Fig. 4 shows a typical arrangement for double solenoid valves

EHH-AMP-712-G/H

Fig. 5

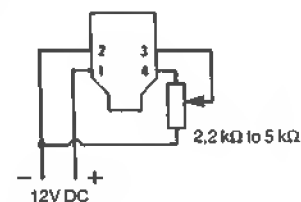
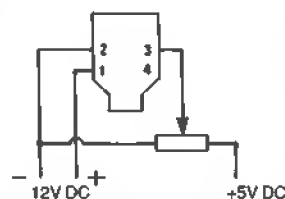


Fig. 6



Figs. 5 & 6 show typical arrangements for single solenoid valves

Wiring and Start-up Procedure

1. Correctly wire the plug (see inset drawing, this page) then, before mounting the plug onto the valve solenoid, apply 12V DC (9,5 to 16V limits) to the "power input" terminals.

2. Check for correct plug function by illumination/non-illumination of the LED:

The LED should illuminate when the valve is exited, and should not be illuminated when the signal is less than 100 mV. If there is a malfunction then a new plug must be fitted.

3. Switch off power supply and command signal and then install the plug on the solenoid. Ensure that the seal is correctly fitted and clamped when the retaining bolt is tightened: *this is essential in providing IP65 protection.*

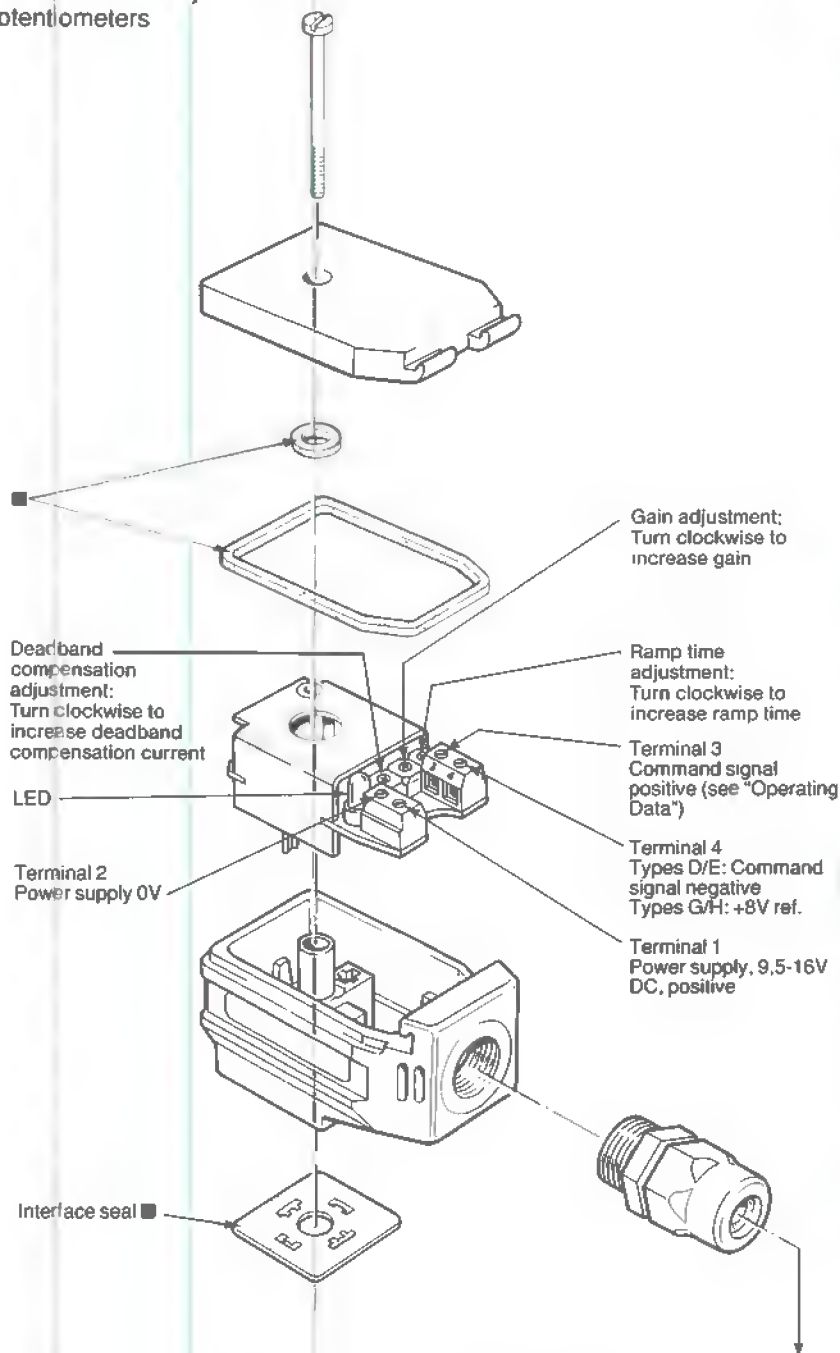
4. Ensure that the hydraulic system will not cause any erratic movement of actuators, then:

- Switch on power supply again
- Repeat LED/function check as in 2.

An LED malfunction now indicates a short circuit at the load.

5. Successful completion of these checks means that the plug and load are ready for use.

Assembly showing wiring connection points, LED and adjustment potentiometers

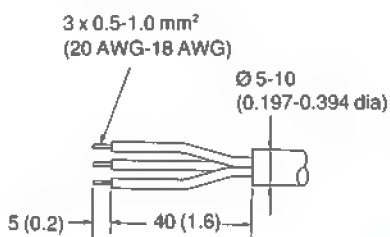


Warnings

- Ensure cable clamp nut is adequately tightened to secure the cable
- Do not install, or remove, the plug when power is on
- Do not connect, or disconnect, the wiring while power is on

■ All seals must be fitted correctly at plug installation to provide protection to IP65 (IEC 529)

Wiring preparation



8. Spare Parts

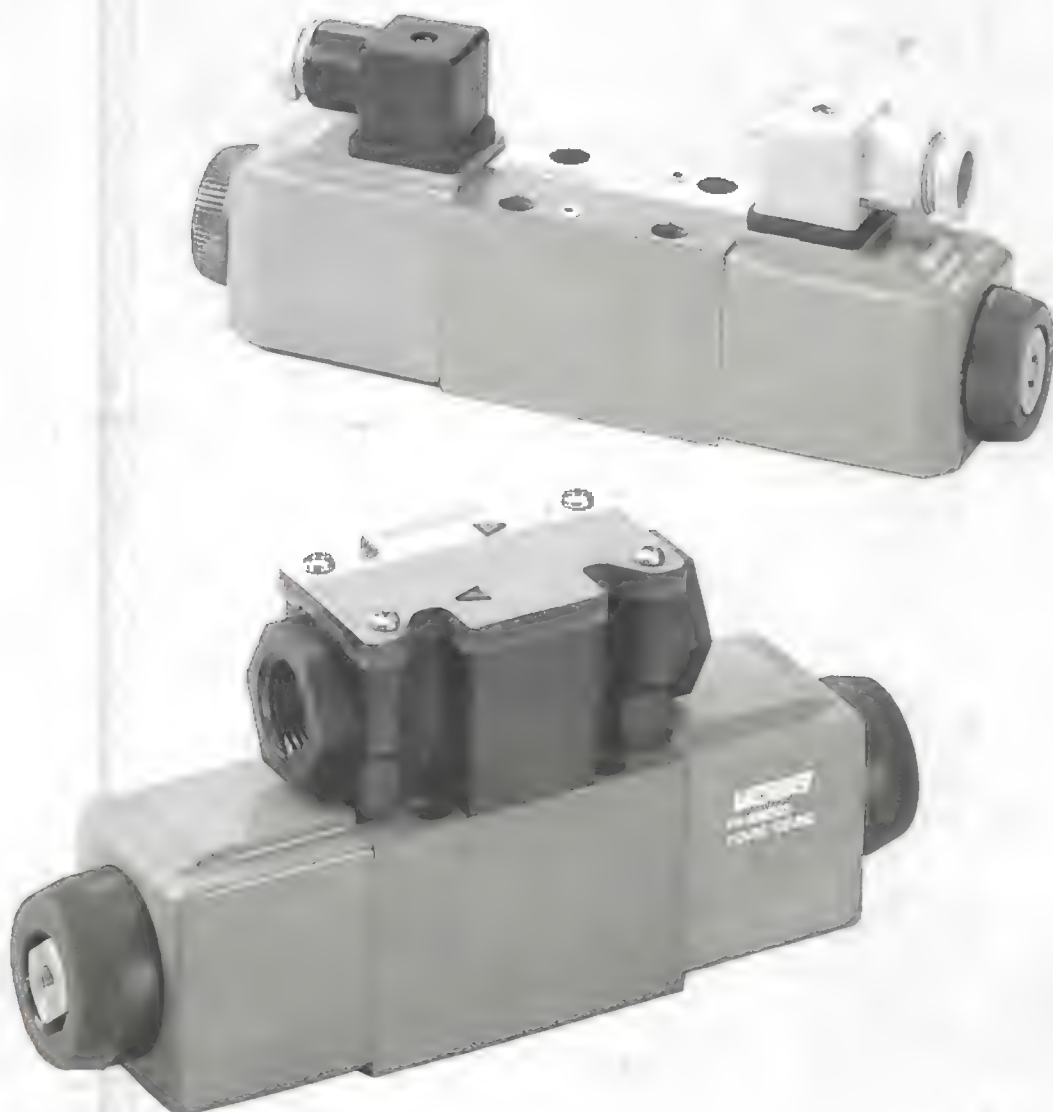
The only spare part available is the interface seal, part number 732100.

9. Ordering Procedure

Order plug by full model code, and spare interface seals by part number.

Solenoid Operated Directional Control Valves

DG4V-3 and DG4V-3S, 60 design
ISO 4401, size 03; ANSI/B93.7M-D03



The DG4V-3 and DG4V-3S, 60 Design

- High and standard performance models
 - up to 80 l/min (21 US gpm) and up to 40 l/min (10.5 US gpm) at 350 bar (5075 psi).
 - builds on Vickers experience as

the major supplier of size 03 valves world-wide.

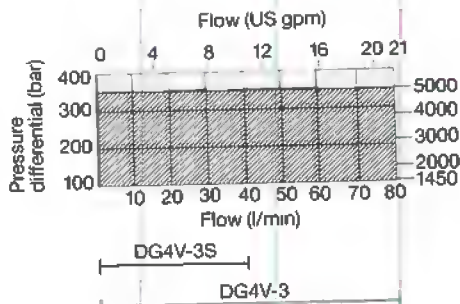
- offers designers the opportunity to select the optimum value package for each application.

- International standard interface. The valve mounting face conforms to ISO 4401, size 03 and is compatible with related international standards.

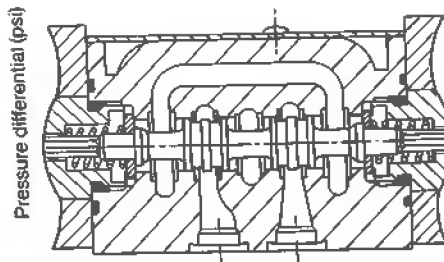
Application Benefits of the 60 Design

1. High pressure and flow capabilities, thanks to special design features

Highly reliable operation up to 80 l/min (21 US gpm) at 350 bar (5075 psi). Establishes new market standards and opens new possibilities to design engineers on valve size selection.

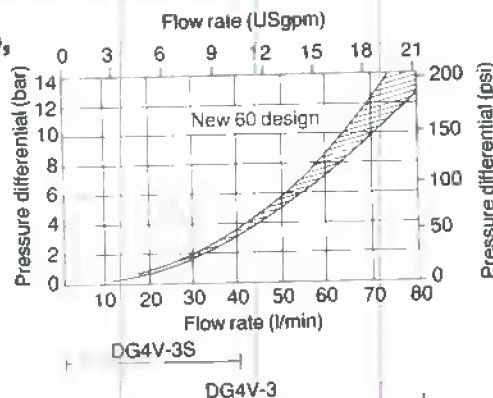


Typical max. pressure differential (P-A-B-T) flow envelope, blocked center spool.

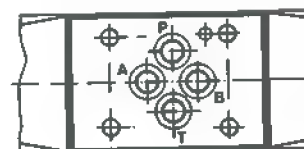


2. Minimal pressure drop, i.e. 2,5 bar (36 psi) at 30 l/min (7.9 US gpm)

Achieved by optimization of the valve body, spool and spool-stroke design. The results: low energy consumption and improved efficiency.



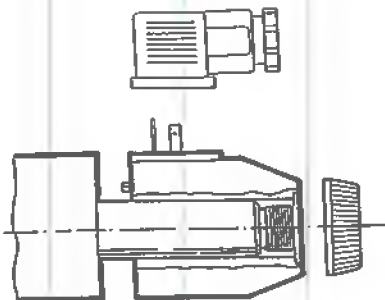
Typical single flow pressure differential for blocked center spool



Mounting surface to ISO 4401 size 03

3. Ease of servicing

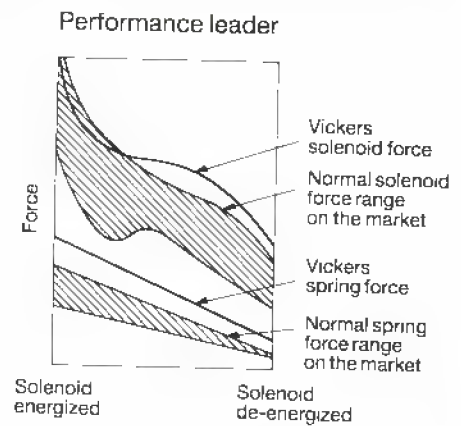
Wet-armature solenoid, screw-in core tube design allows coils to be changed without removing valve from installation and without oil spillage or risk of contaminating system fluid.



ISO 4400 (DIN43650) type coil illustrated.

4. High reliability

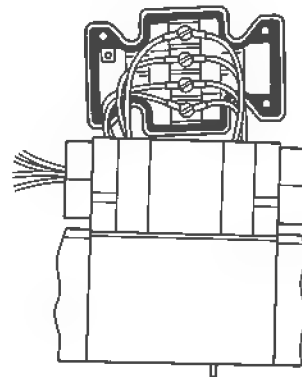
Design of spring forces and profile of DC solenoid force characteristics ensure spool position selection under extreme operating conditions. Result is a valve with high reliability when being energized or de-energized.



5. Electrical connections

9 catalogued coil electrical connection options including:

New conduit box design simplifies electrical wiring connections to solenoids. Orientation tabs prevent incorrect positioning.

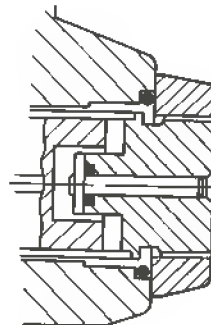


6. Scratch-proof manual override seal

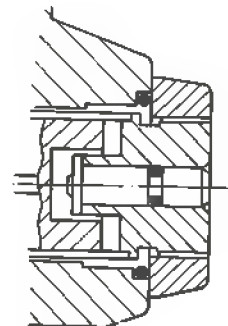
Internal seals are located such that they are beyond reach of any bore damage caused by small tools used to operate the manual override.

Result is no messy oil drips from the manual overrides.

Small diameter manual overrides prevent inadvertent operation.



DG4V-3S



DG4V-3

Wet-armature Solenoid Operated Directional Valves

High Performance DG4V-3, 60 Design
Standard Performance DG4V-3S, 60 Design

Mounting interface

ISO 4401 size 03
ANSI/B93.7M size D03
CETOP RP65H, size 3
DIN 24340, NG6

Basic characteristics

Max. pressure:	
DG4V-3	350 bar (5075 psi)
DG4V-3S	350 bar (5075 psi)
Maximum flow:	
DG4V-3	up to 80 l/min (21 US gpm)
DG4V-3S	up to 40 l/min (10.5 US gpm)

Contents

1. General description and application benefits	4
2. Functional symbols	5
3. Model code	6
Preferred model selection	7
4. Operating data:	
Pressure limits	8
Electrical power consumption	8
Response times	8
Minimum voltage	8
Temperature limits	9
Filtration requirements	9

Page

5. Performance data:	
Max. flow rates:	
For standard performance	
models, DG4V-3S	10
For high performance	
models, DG4V-3	11
Pressure drops	12
6. Installation dimensions	13
7. Mass	16
8. Electrical plugs and	
connectors	16
9. Installation data	19
10. Spare parts data	19
11. Ordering procedure	19

1. General Description and Application Benefits

Basically, these solenoid operated directional control valves are for directing and stopping flow at any point in a hydraulic system. However, this 60-design series has been specially designed and developed to cover all foreseen uses as well as the many traditional uses of the earlier designs. Some of the more important benefits to users are outlined.

In addition to new features and benefits described on pages 2 and 3, the

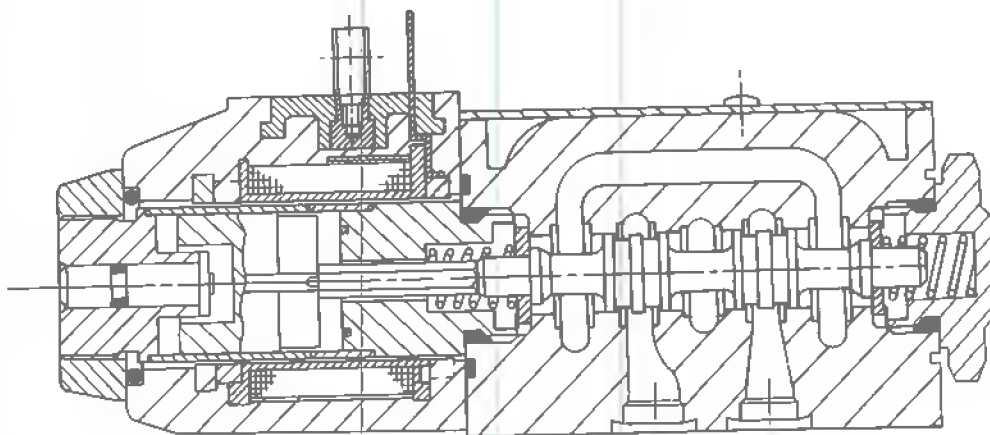
DG4V-3 and DG4V-3S, 60 design,
offer:

- Efficient control of greater hydraulic powers without increasing solenoid power consumption.
- Installed cost and space savings from higher power/weight-and-size ratios.
- Reduced internal leakage reduces power losses, increases system efficiency: the result of improved manufacture of spools and bores.
- Installation flexibility resulting from choice of numerous combinations of

solenoid connectors and locations.

- Multi-fluid capability without need to change seals.
- Higher sustained machine productivity and higher uptime because of proven fatigue life and endurance, tested over 20 million cycles.
- Solenoid coils can be changed quickly and easily without leakage from hydraulic system.
- Compact, cost effective system design when used with Vickers SystemStak™ valves and multi-point subplates.

Construction of a typical single solenoid model

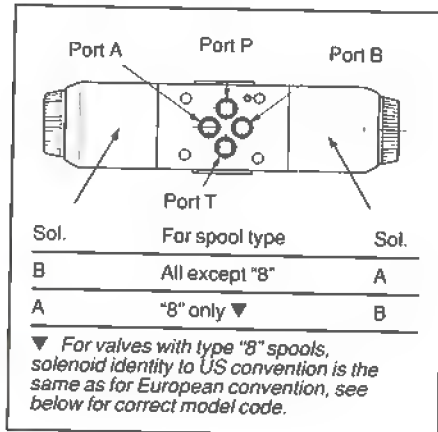


2. Functional Symbols

Spool types shown represent the highest proportion of market requirements. For other spool functions that may be required, consult your Vickers sales representative.

Solenoids Identified to US Convention

Functional symbols related to solenoid identity "A" and/or "B" according to NFPA/ANSI standards, i.e. energizing sol. "A" gives flow P to A, sol. "B" gives flow P to B (as applicable).



Double solenoid valves, two position, detented



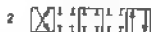
DG4V-3(S)-N(-) valves



Double solenoid valves, spring centered



DG4V-3(S)-C(-) valves



Single solenoid valves, solenoid at port A end



DG4V-3(S)-A(-) valves



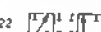
DG4V-3(S)-B(-) valves



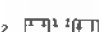
Single solenoid valves, solenoid at port B end



DG4V-3(S)-AL(-) valves



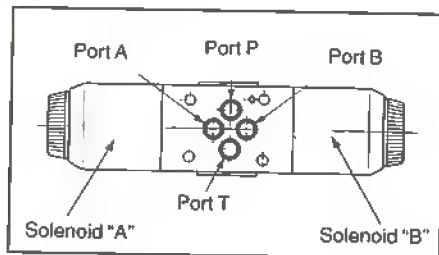
DG4V-3(S)-BL(-) valves



For solenoid identities of valves with type "B" spools see bottom panel of this page, and footnote above left.

Solenoids Identified to European Convention (Specify "V" in model code position 5)

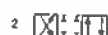
Functional symbols related to solenoid identity "A" and/or "B" according to European convention, i.e. sol. "A" adjacent to "A" port, sol. "B" adjacent to "B" port of valve.



Double solenoid valves, two position, detented



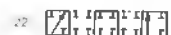
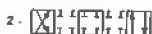
DG4V-3(S)-N(-)-V valves



Double solenoid valves, spring centered



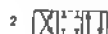
DG4V-3(S)-C(-)-V valves



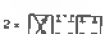
Single solenoid valves, solenoid at port A end



DG4V-3(S)-A(-)-V valves



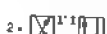
DG4V-3(S)-B(-)-V valves



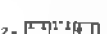
Single solenoid valves, solenoid at port B end



DG4V-3(S)-AL(-)-V valves



DG4V-3(S)-BL(-)-V valves



DG4V-3(S)-8BL(-)-V valves



DG4V-3(S)-8B(-)-V valves



▲ Transient condition only.
◆ For differences see "Pressure drops" table, page 12.
◇ For differences see "Pressure drops" table, page 12, and "Max. flow rates" tables; page 10 for DG4V-3S; page 11 for DG4V-3.
Note: Spool types shown in bold are featured in the "Preferred model selection", two pages on.

3. Model Code

Features shown in bold are found in the "Preferred model selection" on the next page. Features within brackets () are optional; all other features must be specified when ordering. Typical model code examples:

DG4V-3S-6C-M-FW-B5-60

DG4V-3-2A-VM-U-H7-60

DG4V-3(S) - *(L)-(**)-(VM)-(S*)-***** (L)- * * -60-(EN***)-(P**-A**-B**-T**)**

1	2	3	4	5	6	7	8	9	10	11	12	13
---	---	---	---	---	---	---	---	---	----	----	----	----

1 Standard or high performance

- 3** = High performance specification: up to 80 l/min (21 US gpm) at 350 bar (5075 psi)
- 3S** = Standard performance specification: up to 40 l/min (10.5 US gpm) at 350 bar (5075 psi)

2 Spool type

See "Functional symbols" section. For other options consult your local Vickers representative.

3 Spool spring arrangement

- A** = Spring offset, end-to-end
- AL** = As "A" but left-hand build
- B** = Spring off-set, end-to-center
- BL** = As "B" but left-hand build
- C** = Spring centered
- N** = No-spring, detented
- See also "Functional symbols" section.

4 Manual override option

- No symbol = Plain override(s) in solenoid end(s) only ▲
- H** = Water-resistant override(s) on solenoid end(s) ▲
- Y●** = Latching manual override on solenoid ends (includes "H" feature seal) ▲
- Z** = No overrides at either end
- ▲ No override in non-solenoid end of single solenoid valves
- Not available on DG4V-3S, AC models

5 Solenoid energization identity

V = Solenoid "A" is at port "A" end and/or solenoid "B" is at port "B" end, independent of spool type.

Omit for US ANSI B93.9 standard requiring solenoid "A" energization to connect P to A and/or solenoid "B" to connect P to B, independent of solenoid location.

Note: Type "8" spool valves conform to both methods (thus for simplicity all "8" spool valves have the "V" code. See "Solenoid identity" table on page 16.

6 Spool indicator switch

Available on high performance models, DG4V-3, only. Omit when not required.

For DG4V-3-*A(L)-(V)M models with type U (ISO 4400) electrical connector to solenoid; with spool type 0, 2 or 22 only:

S6 = LVDT type DC switch with Pg7 connector plug.

For DG4V-3-*A(L)-(Z)-(V)M-S*-FPA5W valves having mechanical type AC (~) switch, wired to 5-pin receptacle:

- S3** = Switch, wired normally open
- S4** = Switch, wired normally closed

For DG4V-3-*A(L)-(Z)-(V)M-S5-F(T)W/J valves having mechanical type AC (~) switch:

S5 = Switch, free leads

7 Solenoid type/connection(s)

- U** = ISO 4400 (DIN 43650) mounting ◆
- FW** = 1/2" NPT thread conduit box
- FTW** = 1/2" NPT thread conduit box and terminal strip
- FJ** = M20 thread conduit box
- FTJ** = M20 thread conduit box and terminal strip
- FPA** = "Insta-plug" male receptacle only ◆
- FPBW** = "Insta-plug" male and female receptacles
- FPA3W** = Junction box with 3-pin male connector ◆ to NFPAT3.5.29-1980 for: DG4V-3-*A/B(L) DG4V-3S-*A/B(L)
- FPA5W** = Junction box with 5-pin male connector ◆ to NFPAT3.5.29-1980 for: DG4V-3-*C/N DG4V-3S-*C/N DG4V-3-*A/B(L)-**-(V) M-S3/S4

6,3 mm (0.25") spade connector to IEC 780 (DC models only):

SP2 = Dual spade terminals

◆ Female connector to be supplied by customer

8 Indicator lights

For F type coil models: FTJL, FTWL, FPBWL, FPA3WL, FPA5WL (not FPA, male half connector only). Lights available for all voltages listed, see 9 below.

L = Lights fitted

Omit L if lights not required.

For U type coil models use plug with integral light, see page 18

9 Coil rating

Full power coils, see "Operating Data".

A = 110V AC 50 Hz

B◇ = 110V AC 50 Hz/
120V AC 60 Hz

C = 220V AC 50 Hz

D◇ = 220V AC 50 Hz/
240V AC 60 Hz

G = 12V DC

H = 24V DC

For DG4V-3 only (not usable with DG4V-3S):

Low power coils, see "Operating Data".

BL = 110V 50 Hz/
120V 60 Hz

DL = 220V AC 50 Hz/
240V AC 60 Hz

GL = 12V DC

HL = 24V DC

◇ For 60 Hz or dual frequency

10 Port T code

Refer to "Operating Data" for port T pressure ratings

2 = for spool position indicator models S3, S4 and S5 (see position 6)

5 = for standard performance models, DG4V-3S, with AC or DC solenoids

6 = for AC high performance models, DG4V-3, including spool position indicator type S6

7 = for DC high performance models, DG4V-3, including spool position indicator type S6

11 Design number, 60 series

Subject to change. Installation dimensions unaltered for design numbers 60 to 69 inclusive.

- 12 Special features**
 "EN****" code number assigned as required.
 EN21 = CSA approved models, see below

- 13 Port restrictor plugs**
 For details of plug orifice sizes and how to specify in model code see page 15.
 May be fitted to valves by agreement with your Vickers representative.

Omit = No restrictor plugs fitted

Preferred Model Selection

The preferred products listed represent those models which are in regular volume production and are therefore most readily available at competitive prices. Other models constructed from the model code may be made available subject to the quantity requested. Please check price and availability before ordering.

North America			Outside of North America		
Function – see page 5	Connection, voltage and frequency	Design number	Function – see page 5	Connection, voltage and frequency	Design number
Models with conduit box◆ DG4V-3S-0B-M DG4V-3S-0C-M DG4V-3S-2A-M DG4V-3S-2C-M DG4V-3S-2N-M DG4V-3S-7C-M DG4V-3S-8C-VM DG4V-3S-66C-M	-F(T)W-B5 or -F(T)W-D5 or -F(T)W-H5	-60(*)	Models with ISO 4400 connector DG4V-3(S)-2A-M DG4V-3(S)-0B-M DG4V-3(S)-2B-M DG4V-3(S)-0C-M DG4V-3(S)-2C-M DG4V-3(S)-2N-M DG4V-3(S)-6C-M DG4V-3(S)-7C-M DG4V-3(S)-8C-VM DG4V-3(S)-33C-M DG4V-3(S)-52C-M	-U-A6(5) or -U-C6(5) or -U-G7(5) or -U-H7(5)	-60
Models with ISO 4400 connector DG4V-3S-2A-M DG4V-3S-2C-M DG4V-3S-2N-M DG4V-3S-8C-VM DG4V-3S-66C-M	-U-B5 or -U-G5 or -U-H5				

Examples:

DG4V-3S-2C-M-FTW-D5-60
 DG4V-3S-2C-M-FTW-D5-60-EN21*
 DG4V-3S-2N-M-U-H5-60

DG4V-3-8C-VM-U-H7-60
 DG4V-3S-8C-VM-U-H5-60

◆ **Canadian Standards Association Certificate**
 Valves with 1/2" NPT entry conduit box, type FW (model code position [7]), and solenoid code letters B, D, G and H (model code position [9]) have Canadian standards certification. Specify -EN21 (at model code position [12]) to have valve supplied with appropriate CSA coding on nameplate.

Models with "F" type coils (lead wires) and conduit box.

Double solenoid models ▲
 DG4V-3(S)-*C-**-*(V)M-F-**(L)-60
 DG4V-3(S)-*N-**-*(V)M-F-**(L)-60

Single solenoid models ▲
 DG4V-3(S)-*A-**-*(V)M-F-**(L)-60
 DG4V-3(S)-*B-**-*(V)M-F-**(L)-60
 DG4V-3(S)-8BL-**-*(V)M-F-**(L)-60

DG4V-3(S)-*AL-**-*(V)M-F-**(L)-60
 DG4V-3(S)-*BL-**-*(V)M-F-**(L)-60
 DG4V-3(S)-8BL-**-*(V)M-F-**(L)-60

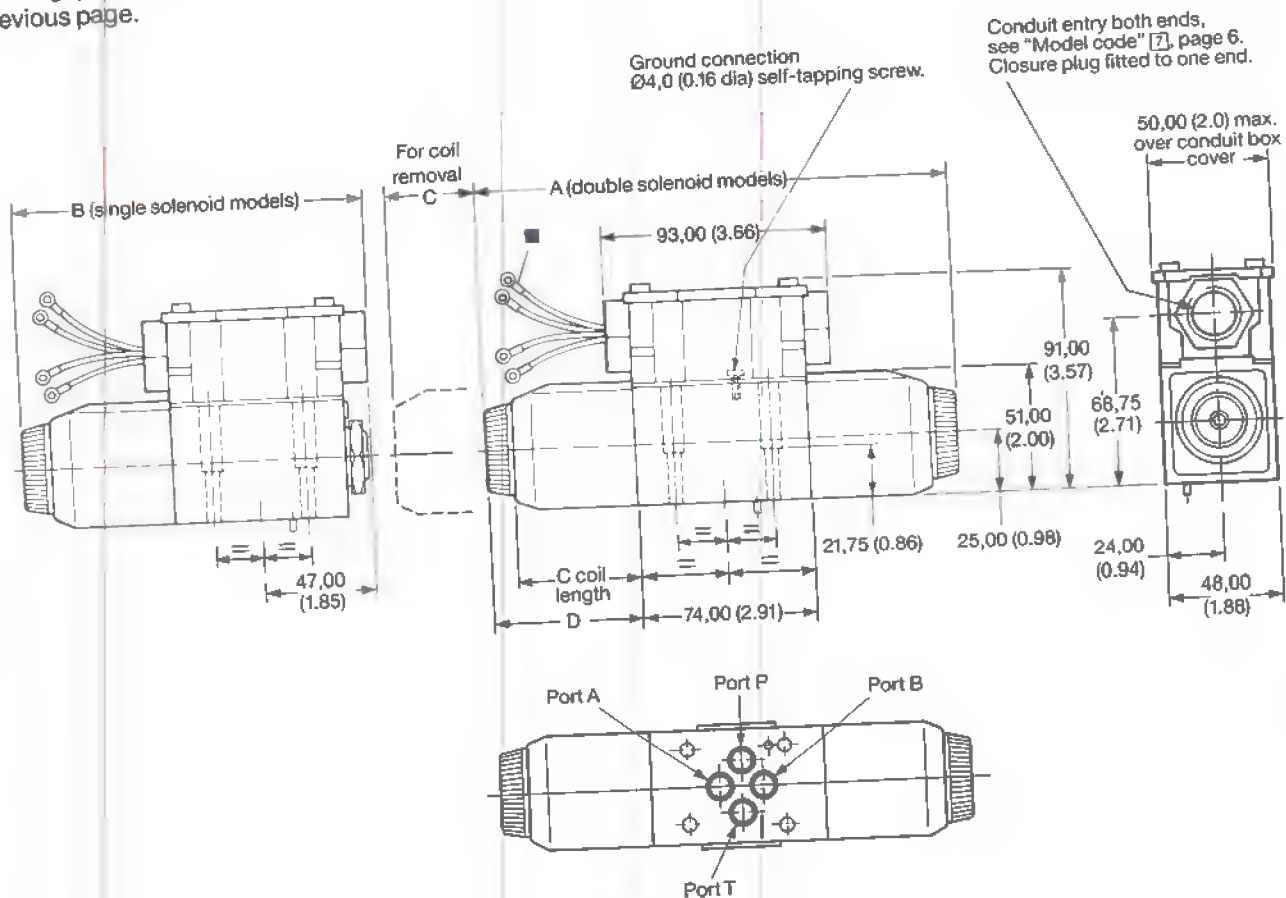
Solenoid and end cap interchanged

For details of terminal strip and lights see page 16.

For details of pre-wired NFPA connector options see page 17.

For details of Vickers "Insta-Plug" see page 18.

For details of water-resistant and of latching type manual overrides see previous page.



Model type	AC or DC	A	B	C	D
All	DC =	220 (8.66)	156,5 (6.16)	61 (2.51)	73 (2.87)
DG4V-3	AC ~	200 (7.87)	146,5 (5.77)	51 (2.12)	63 (2.48)
DG4V-3S	AC ~	200 (7.87)	146,5 (5.77)	45 (2.12)	63 (2.48)

● Not applicable to type "8" spool

▲ For solenoid identities see table on page 16.

■ Ref. "model code" [7]:
 Codes "FJ" and "FW":
 Codes "FTJ" and "FTW":

2 lead wires for each solenoid, approximately 150,00 (6.00) long.
 M3 (#6) terminals provided for customer connection.
 valve supplied with lead wires connected into terminal strip suitable for
 M3 (#6) terminals for customer connection.

DG4V-3-*A(L)-(V)M-S6-U-**-60

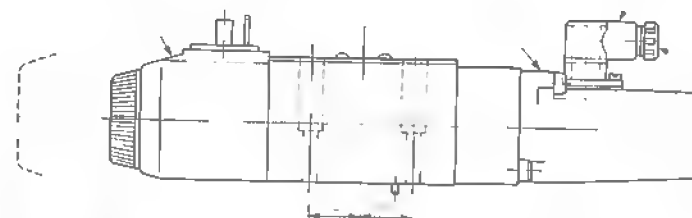
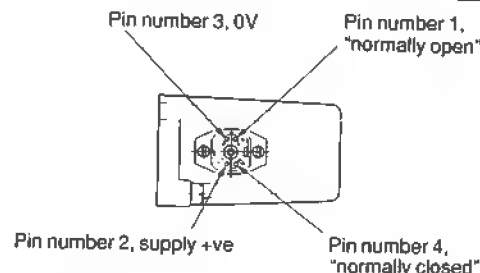
Single solenoid models with LVDT type switch indicating when the spool is in the spring off-set position. ISO 4400 (DIN 43650) connection to solenoid; Pg7 connection to switch.

Location of solenoid for RH build models ▲

Location of switch for RH build models ▲

Plug (part no. 458939) supplied with valve

Cable gland Pg7: Ø 6,0 (0.24 dia)



138,2 (5.44)

248,2 (9.8) with DC solenoid
238,2 (9.4) with AC solenoid

▲ For LH build (e.g. DG4V-3-*AL---60) solenoid and switch locations are reversed.
Other dimensions as DG4V-3 models, page 13

For coil removal:
64 (2.51) DC coil
54 (2.12) AC coil

DG4V-3-*A(L)-(Z)-(V)M-S3-FPA5W-*2-60 DG4V-3-*A(L)-(Z)-(V)M-S4-FPA5W-*2-60 DG4V-3-*A(L)-(Z)-(V)M-S5-F-*2-60

Single solenoid models with mechanical type switch monitoring of spool movement.
Conduit box with leads, or pre-wired to NFPA T3.5.29-1980 receptacle.

See page 17 for details of connections to pre-wired 5-pin receptacle for:
"S3" normally open and
"S4" normally closed.

Normally closed lead (Monitor switch) sleeving identification color white.

Common lead (Monitor switch) sleeving identification color black.

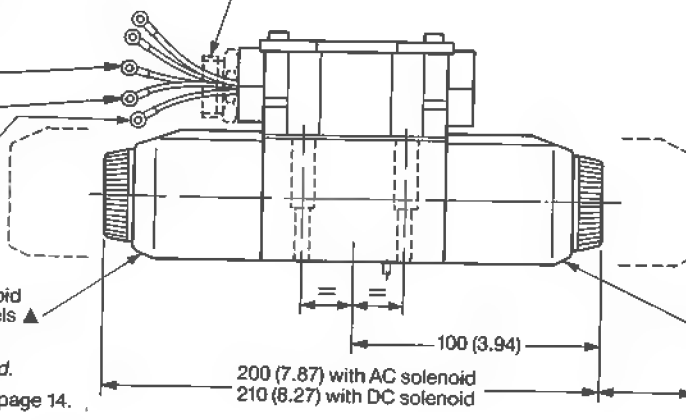
Normally open lead (Monitor switch) no color identification.

Location of solenoid for RH build models ▲

Location of switch and housing for RH build models ▲

▲ For LH builds (e.g. DG4V-3-*AL---60) solenoid and switch locations are reversed.

Other dimensions as DG4V-3-**-C/N models, page 14.



200 (7.87) with AC solenoid
210 (8.27) with DC solenoid

54 (2.12) for removal of switch housing

Port Restrictor Plugs

Restrictor plugs are available for use in ports P, T, A or B. These can be used for restricting flow or for circuit dampening. Restrictor plugs are not recommended for use above 210 bar (3000 psi) system pressure.

Typical model codes:

DG4V-3(S)-**-M-**-**-60-P08

(0.8 mm dia orifice in port P)

DG4V-3(S)-**-M-**-**-60-P10-A10

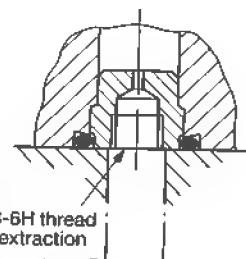
(1.0 mm dia orifice in ports P and A)

Restrictor plug selection table

Code	Orifice diameter	Part number■
*00	Blank	694353
*03	0,30 (0.012)	694341
*06	0,60 (0.024)	694342
*08	0,80 (0.030)	694343
*10	1,00 (0.040)	694344
*13	1,30 (0.050)	694345
*15	1,50 (0.060)	694346
*20	2,00 (0.080)	694347
*23	2,30 (0.090)	694348

* = P, T, A or B, as required

■ Available in multiples of 25 per part number.



M5 x 0.8-6H thread for plug extraction

Maximum port dia in subplate/manifold block:
For steel and SG (ductile) iron: 7,0 (0.3)
For gray iron: 6,5 (0.25)

7. Mass, approx. kg (lb)

	"U" coils	"F" coils + conduit box
DG4V-3 and DG4V-3S with DC coil(s):		
Single solenoid valve	1,6 (3.5)	1,8 (4.0)
Double solenoid valve	2,2 (4.8)	2,3 (5.0)
DG4V-3 and DG4V-3S with AC coil(s):		
Single solenoid valve	1,5 (3.3)	1,6 (3.5)
Double solenoid valve	1,8 (4.0)	2,0 (4.4)
Single solenoid valve with position switch	2,0 (4.4)	2,0 (4.4)

8. Electrical Plugs and Connectors

Terminal Strip and Lights

For valves with type "F" coils.

Conduit box cover and nameplate
complete with sealing gasket and 4 screws

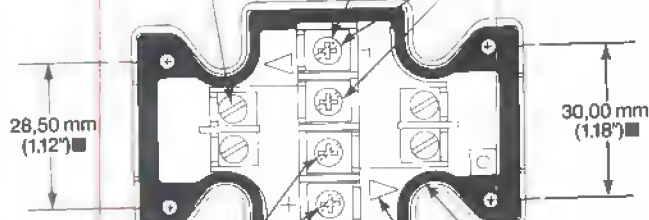
Terminal strip clips to cover;
can be field fitted, order part
number 890345.

2 M3 x 0,5-6H screws (part number 186006)
each end for mounting light assembly

4 terminal screws M3 x 0,5-6H
(part number 02-113355)

Connections to solenoid A (or B,
according to model type)●

Light assembly is held in place by end pair
of M3 screws; can be field fitted to
terminal strip. Part numbers can be found
in "Spare Parts Data", page 19.



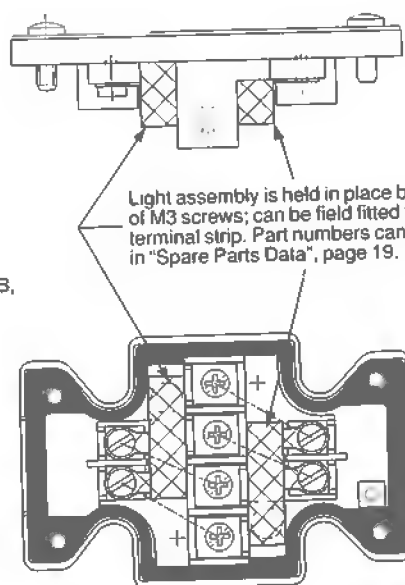
Connections to solenoid B (or A,
according to model type)●

Rubber gasket
2 lenses in cover

● 1. For DC coils the +ve lead(s) must be
connected to the terminal(s) marked +.
When using 3-wire incoming leads to double
solenoid valves (i.e. common neutral) the
inner pair of terminals must be inter-
connected.

2. For correct light indication of energized
solenoid ensure that solenoid leads are
correctly connected: light terminals are
common with each outer pair of solenoid
terminals according to the side with + mark.

■ Difference in these dimensions ensures
correct orientation of nameplate solenoid
identities to valve.



NFPA Connector T3.5.29-1980

DG4V-3(S)---FPA3W(L)-**-60

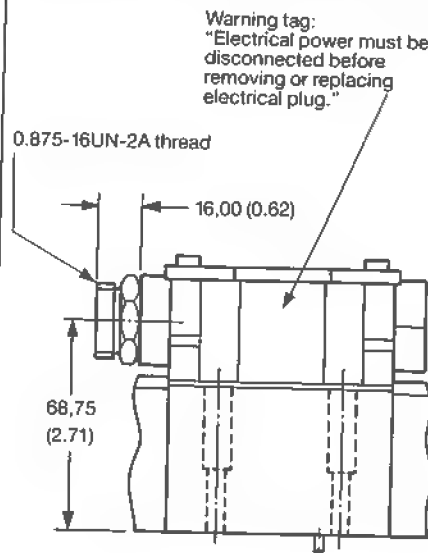
DG4V-3(S)---FPA5W(L)-**-60

DG4V-3---S3-FPA5W(L)-**-60

DG4V-3---S4-FPA5W(L)-**-60

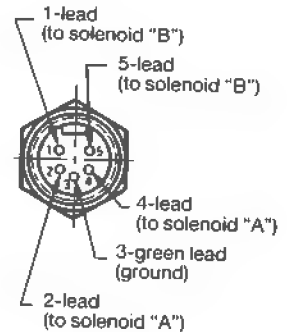
The receptacle is a standard three or five pole connector with shortened leads and terminals added. The five pole plug has four leads 101,6 (4.0) long and one 177,8 (7.0) long. The three pole plug has two leads 101,6 (4.0) long and one 177,8 (7.0). All wires have underwriters recognized non-solder insulated eyelet terminals. The green wire is used for the ground (earth) connection (No. 8 screw furnished). Valves are supplied pre-wired.

Connection details and model type/model code references



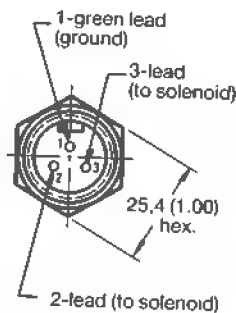
5 pin connector
Use with double solenoid valve (page 14).

Key model code designations:
DG4V-3(S)-*C(-**)-(V)M-FPA5W(L)
DG4V-3(S)-*N(-**)-(V)M-FPA5W(L)



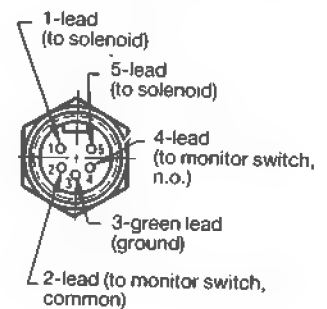
3 pin connector
Use with single solenoid valve (page 14).

Key model code designations:
DG4V-3(S)-*A(L)(-**-)(V)M-FPA3W(L)
DG4V-3(S)-*B(L)(-**-)(V)M-FPA3W(L)



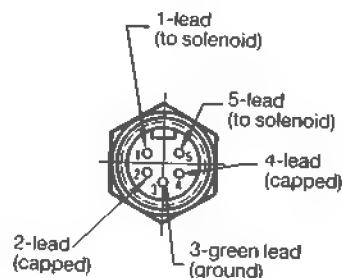
5 pin connector
Use with single solenoid valve with spool position monitor switch (page 15).

Key model code designations:
DG4V-3-*A(L)(-**-)(V)M-S3-FPA5W(L)



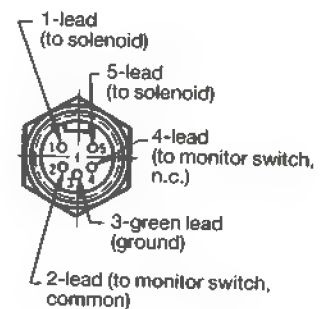
5 pin connector
Use with single solenoid valve (page 14).

Key model code designations:
DG4V-3(S)-*A(L)(-**-)(V)M-FPA5W(L)
DG4V-3(S)-*B(L)(-**-)(V)M-FPA5W(L)



5 pin connector
Use with single solenoid valve with spool position monitor switch (page 15).

Key model code designations:
DG4V-3-*A(L)(-**-)(V)M-S4-FPA5W(L)



Insta-Plug

DG4V-3(S)---FPA---60

DG4V-3(S)---FPBW---60

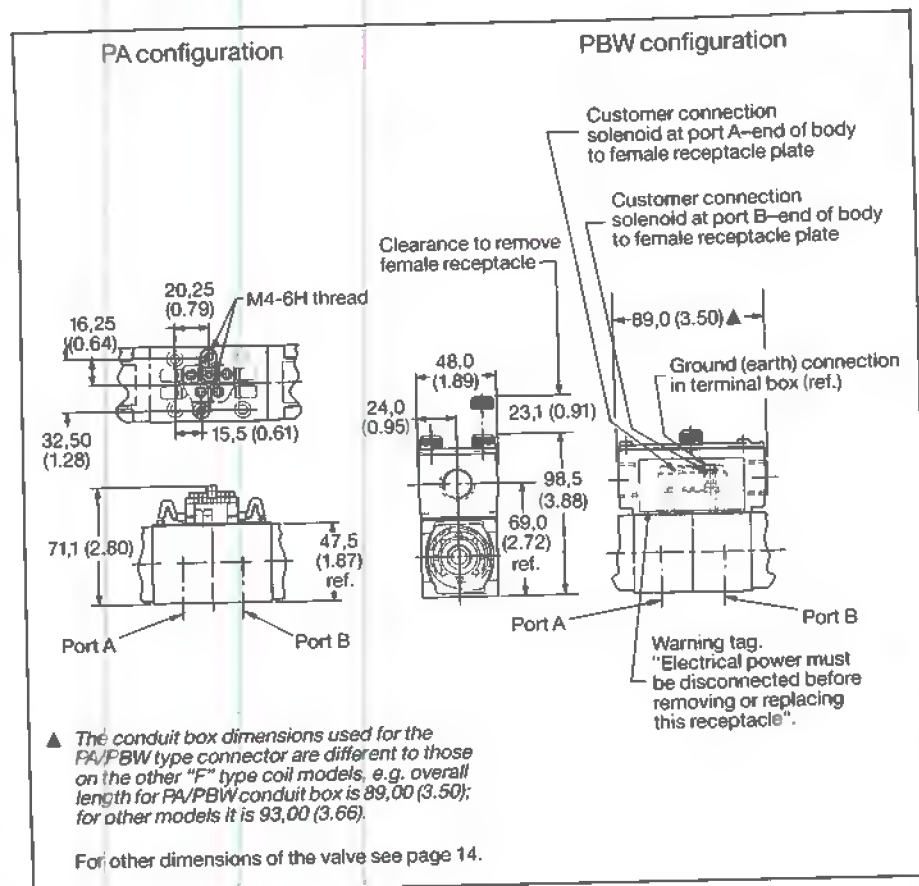
(Applies to valve types shown on page 14.)

Vickers 2-part "Insta-Plug" eliminates breaking electrical inputs for valve disconnect. A male half is pre-wired to the valve body. The mating plug is inside a wire housing with external terminals for machine wire connections.

Captive thumb screws, when loosened, permit the wire housing to be pulled clear of the valve for disconnect. A longer ground post provides first make/last break ground connection.

The PBW configuration combines both male and female plugs in the wiring housing for a self-contained plug-in unit.

Optional solenoid indicator lights are pre-wired to the female plug. Solenoids "A" and/or "B" are identified on the wiring housing.



Plugs for ISO 4400 (DIN 43650) Type Coil Connection

For valves with type "U" coils

The cable entry on these plugs can be repositioned at 90° intervals by reassembly of the contact holder relative to the plug housing.

The cable entry is Pg.11, for cable Ø 6-10 mm (0.24 to 0.39" dia).

Order separately by part number.

Plugs without indicator lights

Part no.	Color	Use on solenoid coil
710775	Black	Sol. B
710776	Gray	Sol. A

Plugs with indicator lights

Voltage	Part number Gray (sol. A)	Black (sol. B)
12- 24V	977467	977466
100-125V	977469	977468
200-240V	977471	977470

9. Installation Data

Mounting Attitude

No restrictions except for no-spring, detented models DG4V-3-*N and DG4V-3S-*N which should be mounted with the spool axis horizontal. These model types may be affected by severe vibration or shock, especially if a solenoid is not held energized.

Mounting Bolt Kits

Bolt kits for direct mounting:

Metric thread, M5-6g BK 616452M

Inch, 10-24UNC-3A BK 590716

Notes:

1. Bolts should be torqued to 7-9 Nm (63-80 lbf in) with threads lubricated.

2. If not using Vickers recommended bolt kits, bolts must be to grade 12.9 (ISO 898) or better.

When mounting DG4V-3(S) valves together with Vickers SystemStak™ valves, determine bolts requirements from table in SystemStak™ catalog C-2027.

Subplates, Manifolds and Mounting Surface

For BSPF port threads and metric mounting bolt types, refer to data sheet V-1310 (see section "J" of catalog C-2005).

For SAE straight port threads and UNC (or metric) mounting bolt types, refer to data sheet I-517355 (see section "I" of catalog #400).

10. Spare Parts Data

Solenoid Coils

AC coils

Code	Voltage/ frequency	"U" type	"F" type	"U" type	"F" type
Full power coils:					
A	110V/50 Hz	02-101725	02-101730	507825	508166
B	110/120V/50/60 Hz	02-101726	02-101731	507833	508169
C	220V/50 Hz	02-101727	02-101732	507826	508167
D	220/240V/50/60 Hz	02-101728	02-101733	507834	508170
Low power coils:					
BL	110/120V/50/60 Hz	N/A	N/A	598562	698563
DL	220/240V/50/60 Hz	N/A	N/A	866455	866457

DC coils

Code	Voltage	"U" type	"F" type	"SP2" type
Full power coils:				
G	12V	507847	508172	02-111166
H	24V	507848	508173	02-111168
Low power coils:				
GL	12V	507855	508175	N/A
HL	24V	507852	508174	N/A

Seal Kits

For valves with spool indicator switch, model types DG4V-3-*A---M-S*---60

..... kit no. 859049

For other models seal kits vary

according to type of coil fitted:

For "U" type coil kit no. 858995

For "F" type coil kit no. 858996

Note: Each seal kit covers a variety of models and may have redundant seals for a particular model.

Light Assemblies

For valves with "F" type coils (lead wires) and conduit box.

Lights can be fitted directly to terminal strip of valves designated "FTW" or "FTJ" in model code position 7; for designations "FW" or "FJ", order appropriate light kit/terminal strip assembly. Refer to section "Electrical Plugs and Connectors", page 16, or Spare Parts Bulletin for assembly details.

Select light according to coil voltage, one light per solenoid.

Coil voltage	Light kit ▲ part number	Identifying color	Light kits with terminal strip ▲
110/50; 120/60	893234	Red	893229
220/50; 240/60	893235	Blue	893230
12V DC	893231	Black	893226
24V DC	893232	Green	893227

▲ Each kit contains 2 lights.

11. Ordering Procedure

When ordering please specify full model designations of valves (see "Model code" section) and part or kit numbers of spare parts as in the

previous section. See "Preferred model selection", page 7.

Hydraulics, electro-
hydraulics, electronics: high
performance products with
quality standards second to
none – for enhanced
productivity and economy.

Vickers components and
systems are used extensively
for in-plant machinery, mobile
vehicles, automotive
equipment, aerospace and
marine applications.

Presented by:

VICKERS
A TRIMOVA Company

Power Amplifier

Type EEA-PAM-513-A-12
For KCG-3, 10 Series
Proportional Pressure Control Valves



1. General Description

The power amplifier has five voltage inputs (one inverting) and a current input for 0-20 mA. The "set minimum" and "gain" adjustments allow the amplifier to be easily tuned to the proportional pressure control valve. The ramp potentiometer on the front panel simultaneously adjusts the output acceleration and deceleration. The ramp function is normally enabled; it can be permanently disabled by an external wire link, or selectively enabled/disabled using a remotely located switch.

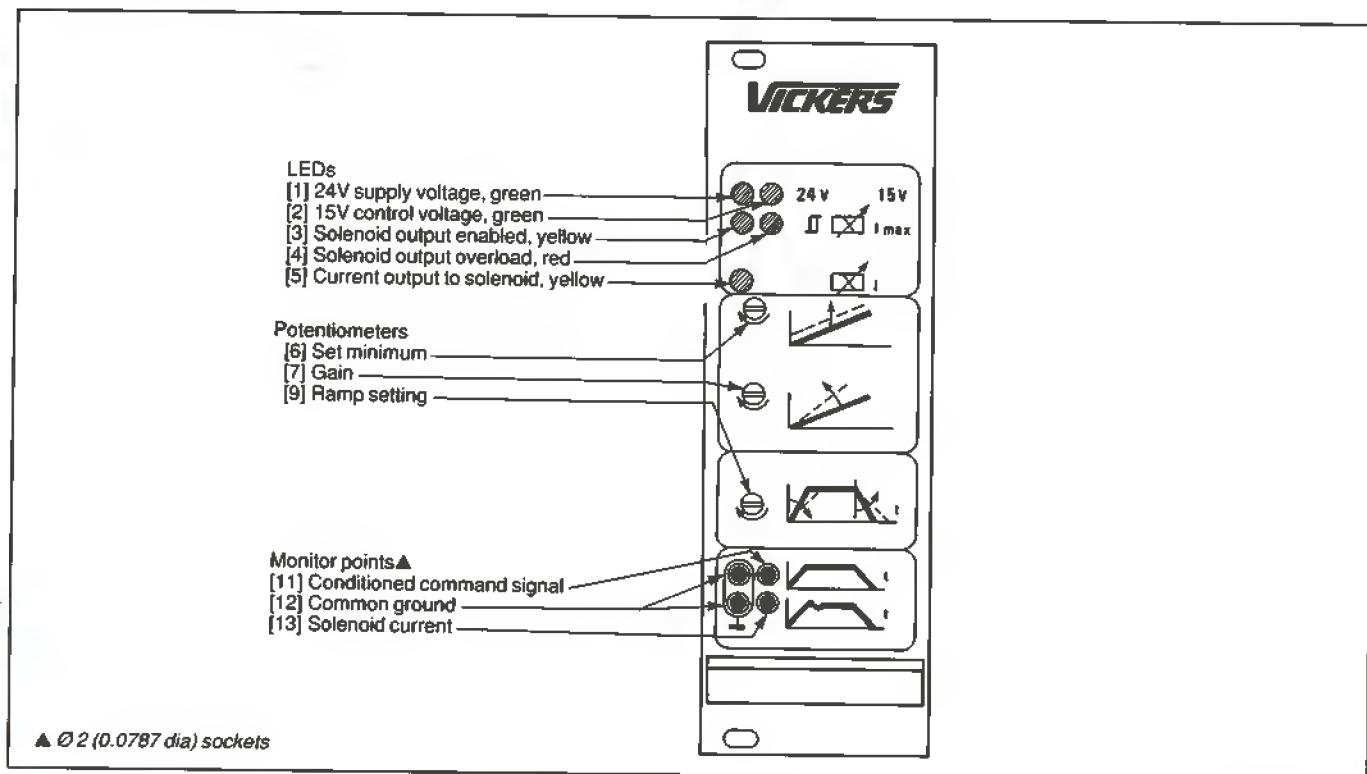
Monitor points on the front panel allow measurement of the conditioned command input signal (after set minimum, gain and ramp functions)

and of the solenoid current. The latter is scaled to give 1 volt per ampere.

Features

- User-friendly front panel with all the necessary adjustments, LEDs and monitor points
- Electronic overload protection with automatic reset
- Pulse width modulation for high efficiency
- Ramp function generator for control of pressure increase and decrease rates
- 24V DC power supply
- Either current or voltage input signals
- Standard input and output signals

2. Front Panel



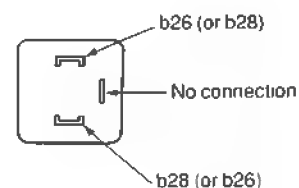
3. Operating Data

Power requirements	24V DC nominal x 40W Maximum voltage range: 20 to 30V (including ripple) Max. ripple 2V pk-to-pk Reverse polarity protected
Output voltages for control: At pin z22 At pins z2 and b2	+15V x 50 mA; ripple <50 mV pk-to-pk $\pm 10V (\pm 1\%) \times 5 \text{ mA}$
Command signal inputs Voltage inputs: Direct-voltage pins Inverting-voltage pin Voltage range Input impedance Current input: Current pin Current range Input impedance	b8, b6, z8, b10 z10 0 to 10V 47 k Ω z6 0 to 20 mA 100 Ω
Power drive, pulse-width modulated (PWM): Maximum solenoid current	1,8A, short-circuit protected
Dither	Factory set
Set minimum pressure control: Factory setting Adjustment	Zero solenoid current 0 to 1,0A solenoid current
Gain control: Factory setting Adjustment	Max. pressure at 10V command signal 0,06 A/V to 0,18 A/V
Ramp time adjustment: Factory setting One adjustment for increasing and decreasing pressure	Minimum (20 ms approx.) 20 ms to 2s with "set minimum" at zero
Overload detection, factory set	Automatic reset when fault removed
Drive enable/disable: Enable (power available to solenoid) Disable (no power to solenoid)	+10V to +30V to z24 (>6 k Ω) Open circuit or up to 0,8V
Ramps enable/disable: Enable (valve switching rate limited by ramp potentiometer) Disable (fastest valve switching; ramp circuit bypassed)	No connection required Connect b20 to b12
Command signal monitor points: Front panel socket and b18 Output impedance	0 to 10V full scale. Command signal conditioned by "set minimum", gain and ramp function settings. 10 k Ω ; short-circuit protected
Solenoid current monitor points: Front panel socket and z18 Output impedance	1 V/A solenoid current 10 k Ω ; short-circuit protected

Continued on next page

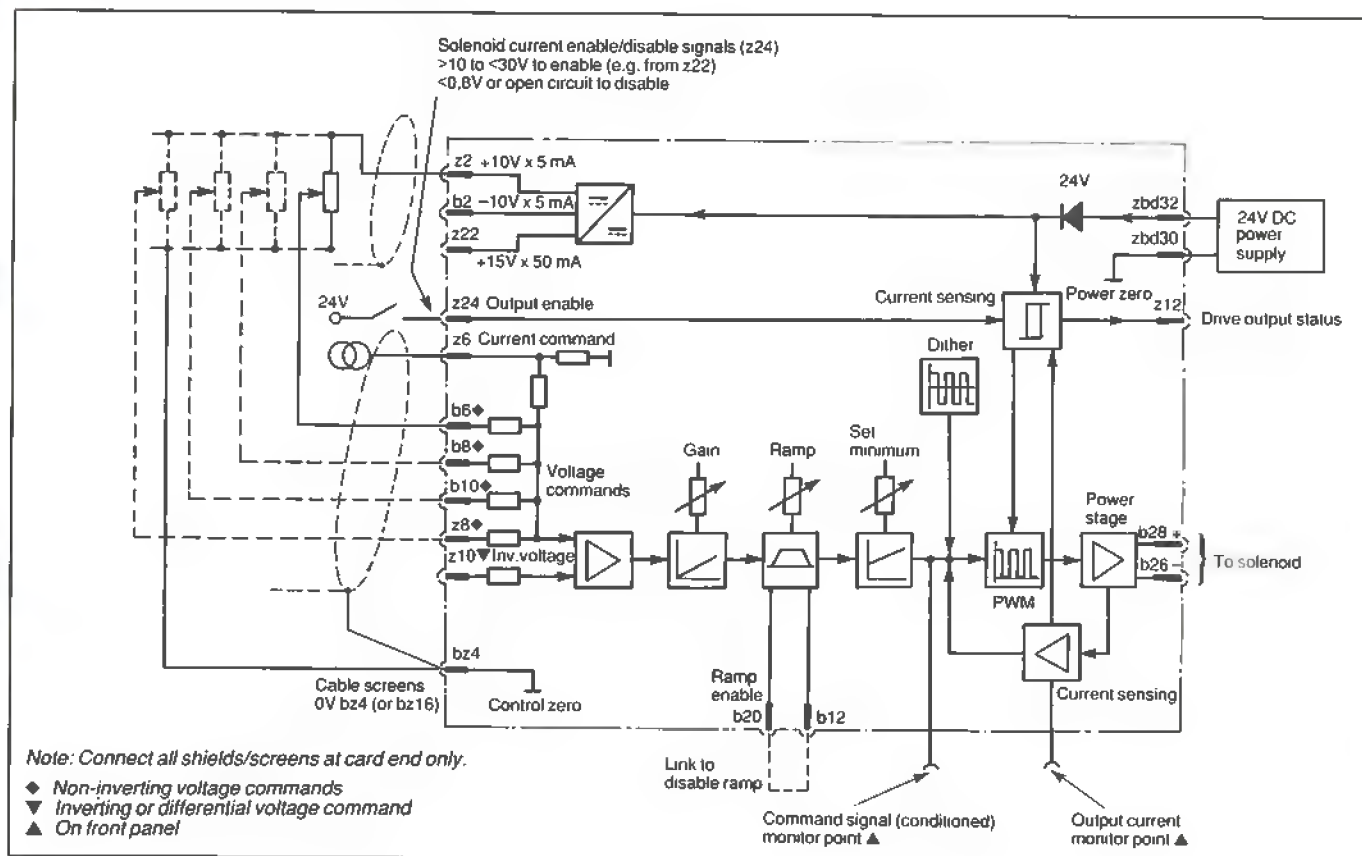
Drive output status indicator b12: Drive enabled Drive disabled	>+6V <-6V
Ambient temperature range	0 to 50°C (32 to 122°F)
Edge connectors	DIN 41612 F48 male type on the board. Mating connector can be F32 or F48 female type.
Mass	200g (0.44 lb)
Installation recommendations leaflet for electronic amplifiers	ML-B-9046
Supporting products (see catalog C-2007): Power unit Portable test equipment Cardholder (F32) Edge connector (F48)	EHA-PSU-704-A-10 EHA-TEQ-700-A-20 Part no. 732682 Part no. 508178

Solenoid Connections



Note: Connections *not* polarity sensitive

4. Circuit and Connections

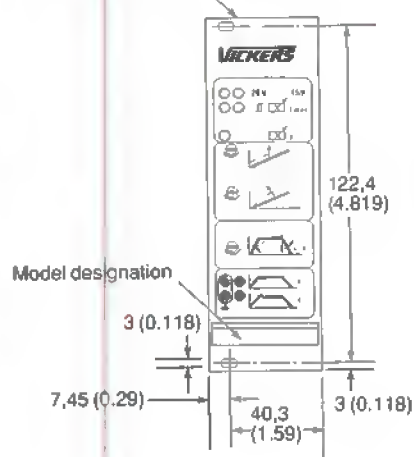


5. Installation Dimensions in mm (Inches)

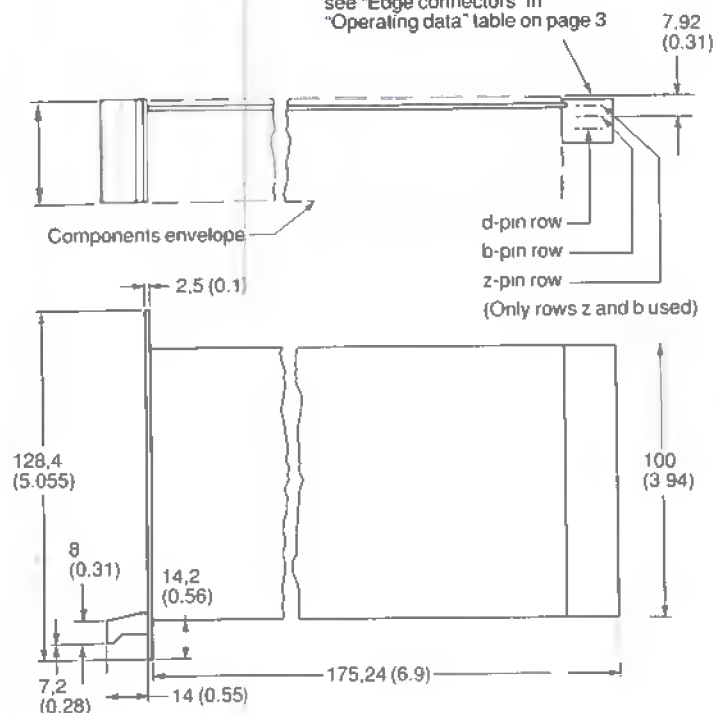
Plug-in unit of 3U height, to IEC 297

3rd angle projection 

M2,5 x 11 (0.43) long collar screws supplied with panel, for fixing



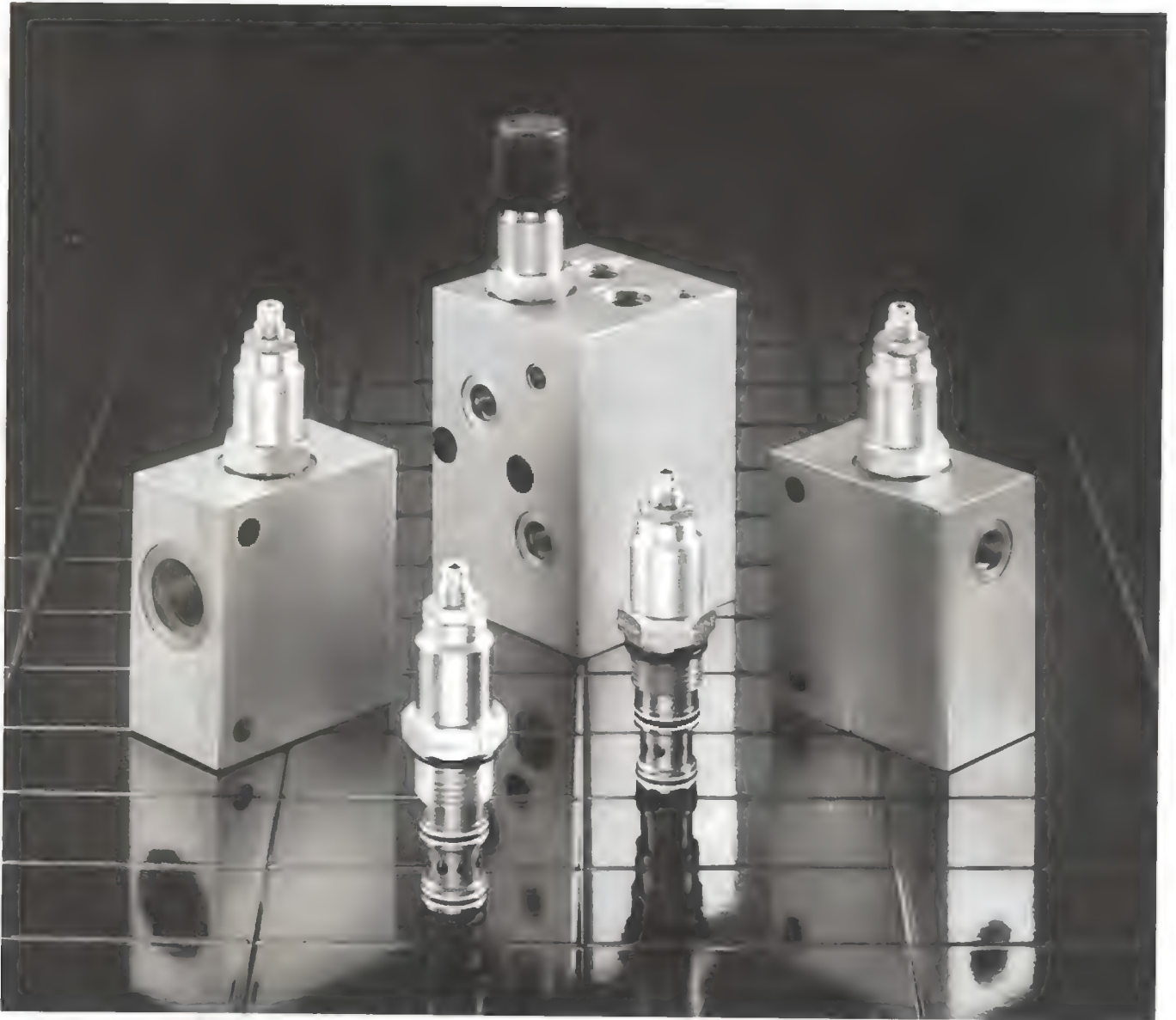
DIN 41612 F48 male connector; see "Edge connectors" in "Operating data" table on page 3



Presented by:

VICKERS
A TRIUNOVA Company

Screw-in Cartridge-Valves Size 12



Contents

CBV*	Counterbalance Valves	3
RV11	Relief-Valve-Pilot Operated, Sliding Spool	15
VRV11	Relief Valve, Vented	17
PRV11	Pressure Reducing Valve, Pilot Operated	19
PRV12	Pressure Reducing/Relieving Valve	21
PSV11	Pressure Sequence Valve, Internally Piloted	23
FCV11	Flow Control Valve	25
CV11	Check Valve	27
C-12-2	2-Way Cavity Dimensions	29
C-12-2U	2-Way Cavity (with Undercut) Dimensions	30
C-12-3	3-Way Cavity Dimensions	31
C-12-3S	3-Way Short Cavity Dimensions	32
Fatigue Rated Housings	33
Supporting Products	34

Counter Balance Valves

Application

Vickers screw-in cartridge counter-balance valves provide continuous protection from pump cavitation and prevent an actuator from running ahead of the pump supply. Operating as pilot operated load control valves with a reverse flow check function, they are easily integrated into Vickers MCD manifold systems or used individually in a variety of standard blocks.

Vickers screw-in cartridge counterbalance valves also provide thermal relief protection in closed systems.

Features and Benefits

Cartridge Design

Offers maximum system design flexibility using minimum manifold space.

Ease of Service

Compact cartridge design may easily be replaced in the field, if required.

345 Bar Rated Pressure

Applicable to virtually all industrial and mobile system requirements.

Efficient Design

Low leakage design restrains flow from the hydraulic actuator.

Hardened and Ground Steel Operating Parts

Maximum durability and long life.

Reverse Flow Check

Allows free flow in the reverse direction.

Integral Pilot Assist

Choice of two pilot ratios for smooth control of loads and cushioned deceleration.

Multiple Mounting Configurations

Offers maximum design flexibility with minimal piping required. SystemStak™ valves are also available, (ISO 4401, CETOP 5, ANSI/NFPA D05).

Ratings

Performance data is typical with fluid at 28 cST (132 SSU) and 38° C (100° F)

Maximum Pressure (All Ports) 345 bar (5000 psi)

Rated Flow 114l/min (30m USgpm)

Cracking Pressure Adjustment Range 62 – 207 bar (900 – 3000 psi)
186 – 345 bar (2700 – 5000 psi)

Pilot Ratios 4:1, 10:1

Leakage 5 drops/min, Port 1 to Port 2 at 77% of crack setting

Pressure Drop Characteristics See pressure drop curves.

Temperature Ranges –40 to 120° C (–40 to 248° F)

Fluids

All general purpose hydraulic fluids such as MIL-H-5606, SAE 10, SAE 20, etc.
Refer to Vickers oil sheet I-286-S.

Filtration

ISO 4406, Class 16/13
or cleaner

Materials

Aluminium or steel

Cavity

C-12-3S (See page 3)

Weight

0.356 kg (0.785 lbs)

Pilot Pressure Calculation (To open valve by remote control)

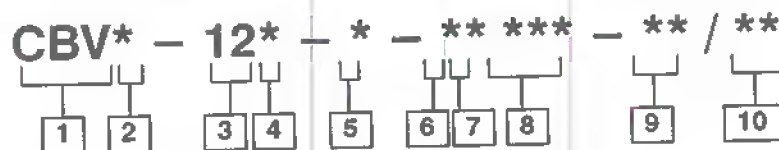
For 4:1 Ratio

$$\frac{\text{Pilot pressure, nominal at port 3} = \text{Cracking pressure} + (5 \times \text{Port 2 pressure}) - \text{Port 1 pressure}}{4}$$

For 10:1 Ratio

$$\frac{\text{Pilot pressure, nominal at port 3} = \text{Cracking pressure} + (11 \times \text{Port 2 pressure}) - \text{Port 1 pressure}}{10}$$

Model Code



1 Valve Function

CBV - Counterbalance valve

2 Pilot Ratio

1 - 4:1
2 - 10:1

3 Valve Size

12 - Size 12

4 Seals

Blank - Buna "N"
V - Viton

5 Adjustment Options

S - Screw with locknut
C - Cap over screw
K - Hand knob

6 Cartridge/Valve

O - Cartridge

Cartridges with Housings:

I - Inline body
B - $\frac{3}{4}$ " SAE 4-bolt pad mounting
N - Close coupled - nipple mounting
G - Gasket mounted - single
D - Dual counterbalance - line mounted
M - Dual counterbalance - line mounted with integral shuttle valve
P - Dual counterbalance - gasket mounted

7 Valve Housing Material

A - Aluminum
standard light duty housing,
maximum operating pressure 207
bar (3000 psi)
S - Steel
standard fatigue rated housing,
NFPA pressure rated 345 bar
(5000 psi)

8 Housing Port Sizes

I - Inline Body
4G - $\frac{1}{2}$ " BSPP
6G - $\frac{3}{4}$ " BSPP
10T - SAE 10
12T - SAE 12
B - 4-Bolt Pad
4T - $\frac{3}{4}$ " SAE
N - Nipple Mounting
8T - SAE 8
G - Gasket Mounted (Single)
8T - SAE 8
4G - $\frac{1}{2}$ " BSPP
D - Dual Line Mounted
10T - SAE 10
12T - SAE 12
4G - $\frac{1}{2}$ " BSPP
M - Dual Line Mounted
10T - SAE 10
12T - SAE 12
4G - $\frac{1}{2}$ " BSPP
P - Dual Gasket Mounted
8T - SAE 8
4G - $\frac{1}{2}$ " BSPP

9 Pressure Range

30 - 62-207 bar (900-3000 psi)
50 - 186-345 bar (2700-5000 psi)

10 Pressure Setting (Opt.)

(Specified by customer in 100 psi
increments) otherwise:
20 - 138 bar (2000 psi)
35 - 241 bar (3500 psi)

Counterbalance Cartridge

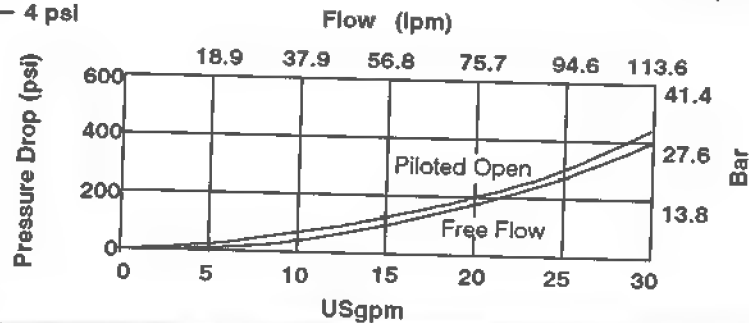
CBV*-12*-*-O

Pressure Drop Curve

Cartridge Only

Free flow crack pressure - 4 psi

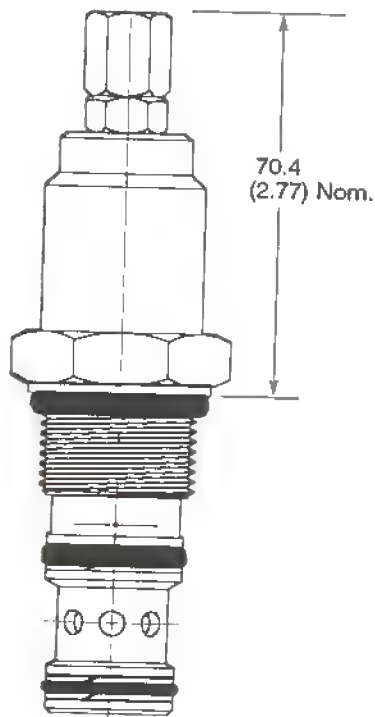
28 cSt (132 SSU) oil @ 38°C (100°F)



Adjustment Options

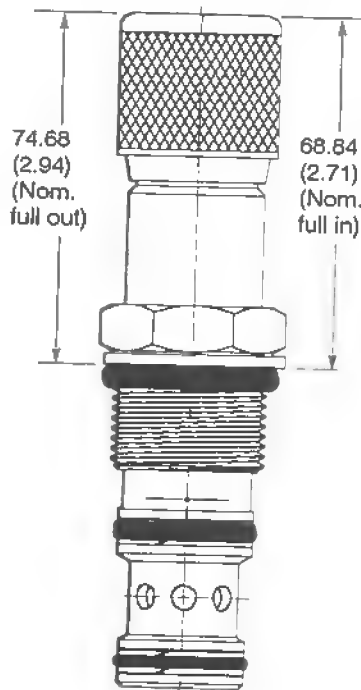
Dimensions mm(Inch)

"C" (Cap over screw) Adjustment

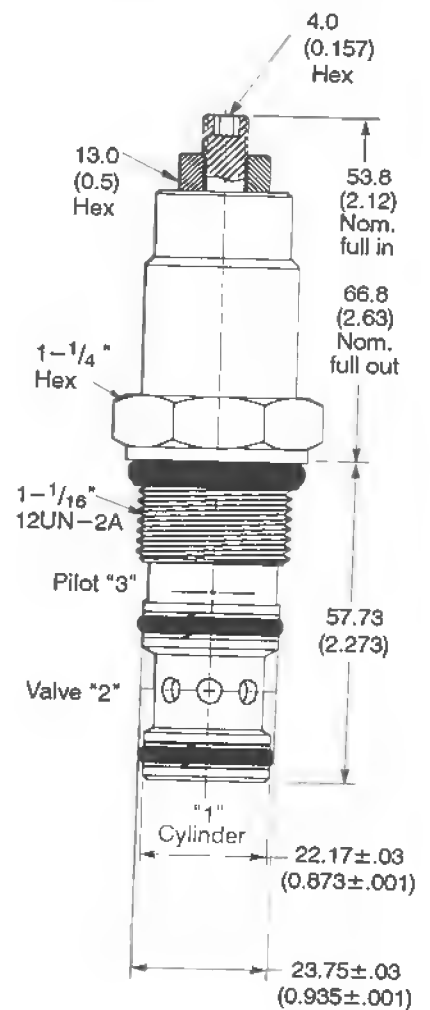


"K" (Handknob) Adjustment

Screw OUT to increase pressure setting;
Screw IN to release load.



"S" (Screw w/locknut) Adjustment



Standard Cavity Dimensions

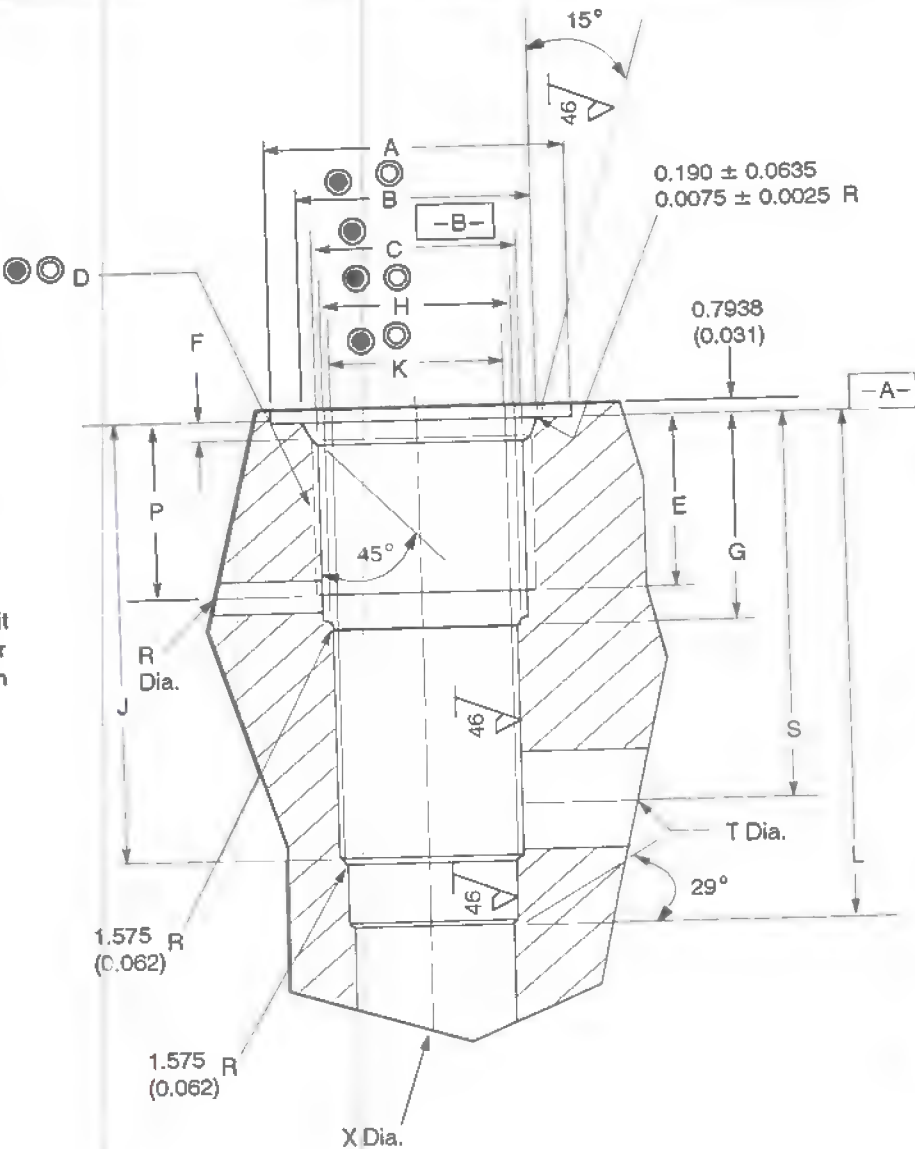
C-12-3S, 3-Way Short Cavity

mm (Inch)

The counterbalance cartridge in this catalog is designed to fit into the cavity dimensioned on this page.

Cavity bores can be machined accurately in aluminum or steel. The necessary UNF, or UN threads may be machined using standard small tools, possibly already in your machine shop or from a local tool supplier. For in depth advice on the machining of cavities, consult your Vickers sales specialist.

Either you, our customer, or Vickers can design and manufacture customized manifolds or housings dedicated to individual applications. We call the resulting valve packages Modular Circuit Designs (MCDs). Cartridges selected for your application can be accommodated in one or more MCDs, according to your requirements.



Cavity

Cavity	A Spotface	B .002	C .002	D Thread thd. class 2B	E Full Thread	F	G	H ± .001	J	K ± .001
C-12-3S	38.1 (1.5000)	29.160 (1.148)	24.765 (0.975)	26.988 (1 1/16-12)	22.225 (0.875)	3.302/3.683 (0.130/0.145)	25.4 (1.000)	23.825 (0.938)	48.26 (1.900)	22.25 (0.876)

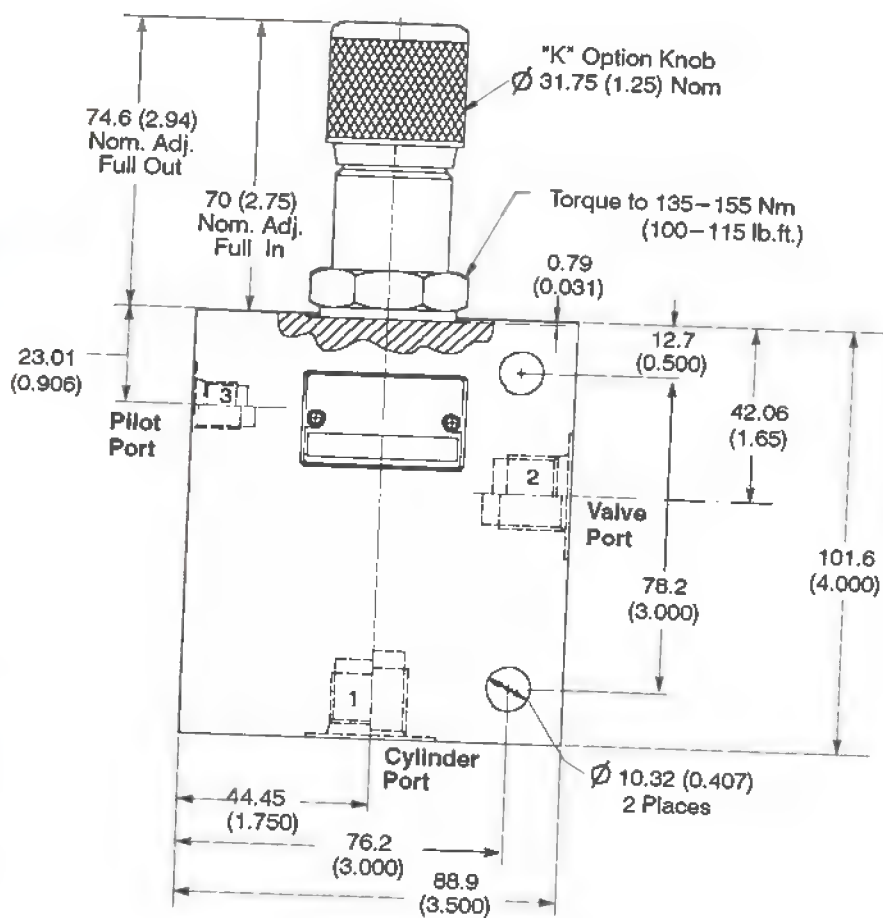
L	P	R Max. Dia.	S	T Max. Dia.	X Max. Dia.
59.69 (2.350)	22.23 (0.875)	4.826 (0.190)	41.275 (1.625)	12.7 (0.500)	20.625 (0.812)

These diameters ☒ .0508 mm (.002 inch) B unless otherwise specified.

These diameters ☐ .0254 mm (.001 inch) A unless otherwise specified.

CBV*-12*-*-J

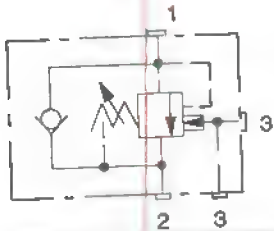
Port Size	Cylinder Port (1)	Valve Port (2)	Pilot Port (3)
10T	SAE 10	SAE 10	SAE 6
12T	SAE 12	SAE 12	SAE 6
4G	1/2" BSPP	1/2" BSPP	3/8" BSPP
6G	3/4" BSPP	3/4" BSPP	3/8" BSPP



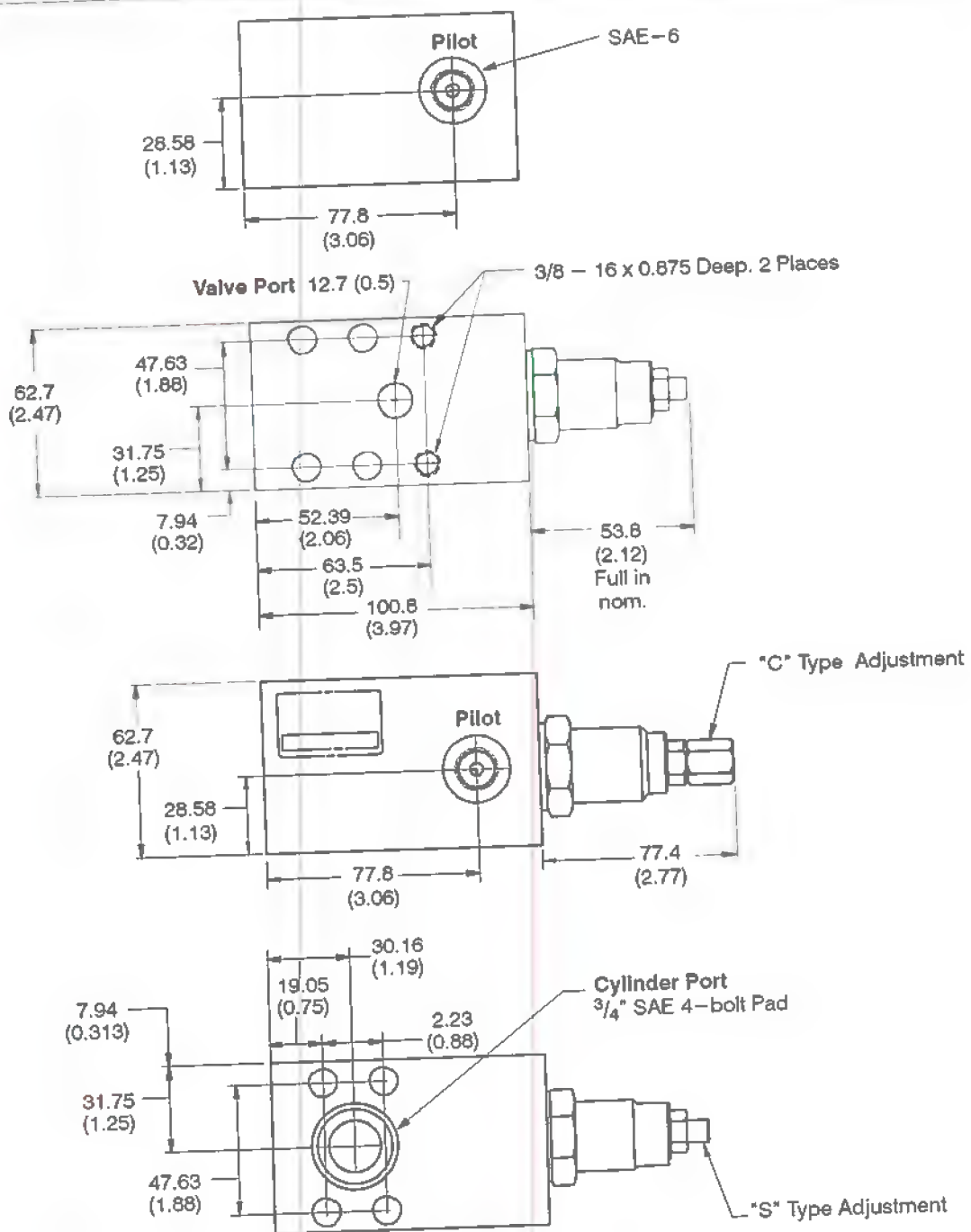
$\frac{3}{4}$ " SAE 4-Bolt Pad Mounting

CBV*-12*-*-B

Functional Symbol



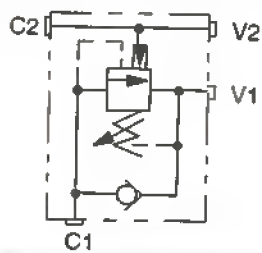
Dimensions mm (inch)



Close Coupled Nipple Mounting

CBV*-12*-*-N

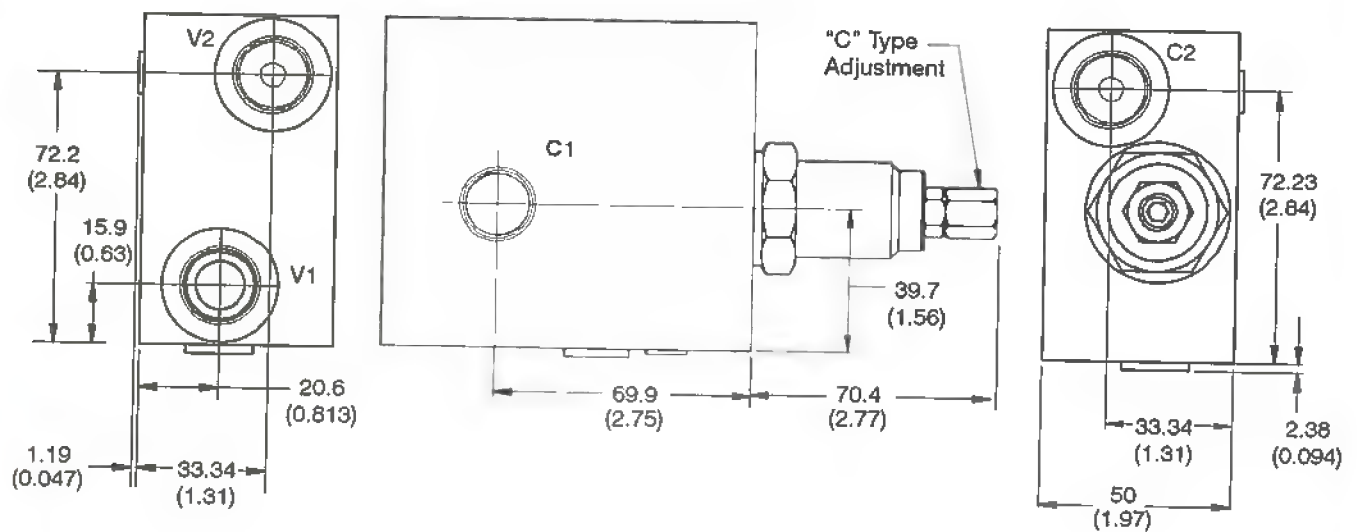
Functional Symbol



Dimensions

mm (inch)

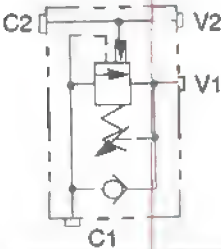
Port Size	C1	C2	V1	V2
8T	1/2" NPTF	SAE 8	SAE 8	SAE 8



Gasket Mounted – Single

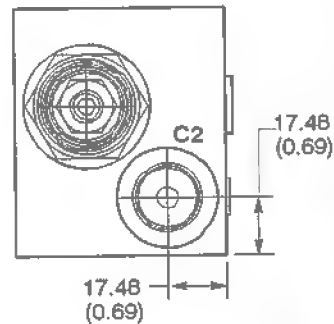
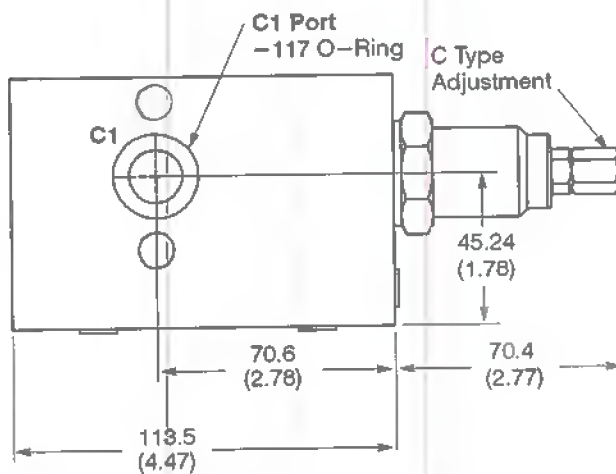
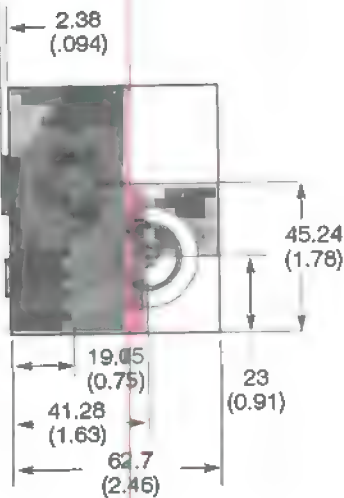
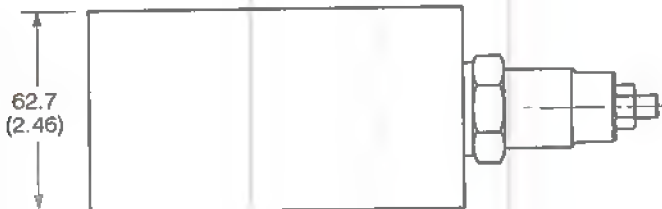
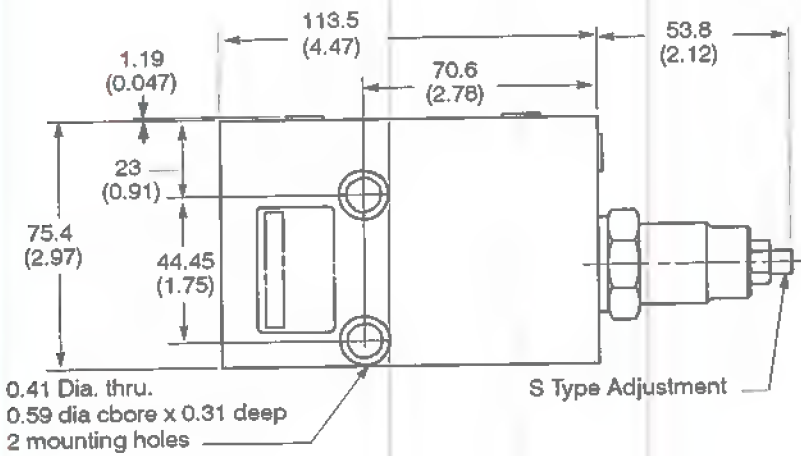
CBV*-12*-*-G

Functional Symbol



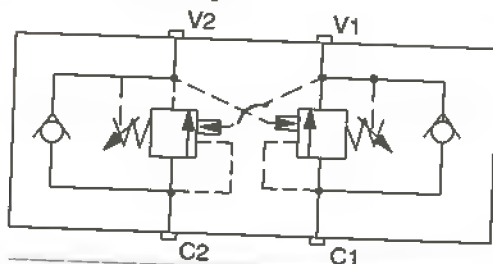
Dimensions mm (inch)

Port	C1	C2	V1	V2
8T	0.625 DIA	SAE 8	SAE 8	SAE 8
4G	0.625 DIA	1/2" BSPP	1/2" BSPP	1/2" BSPP



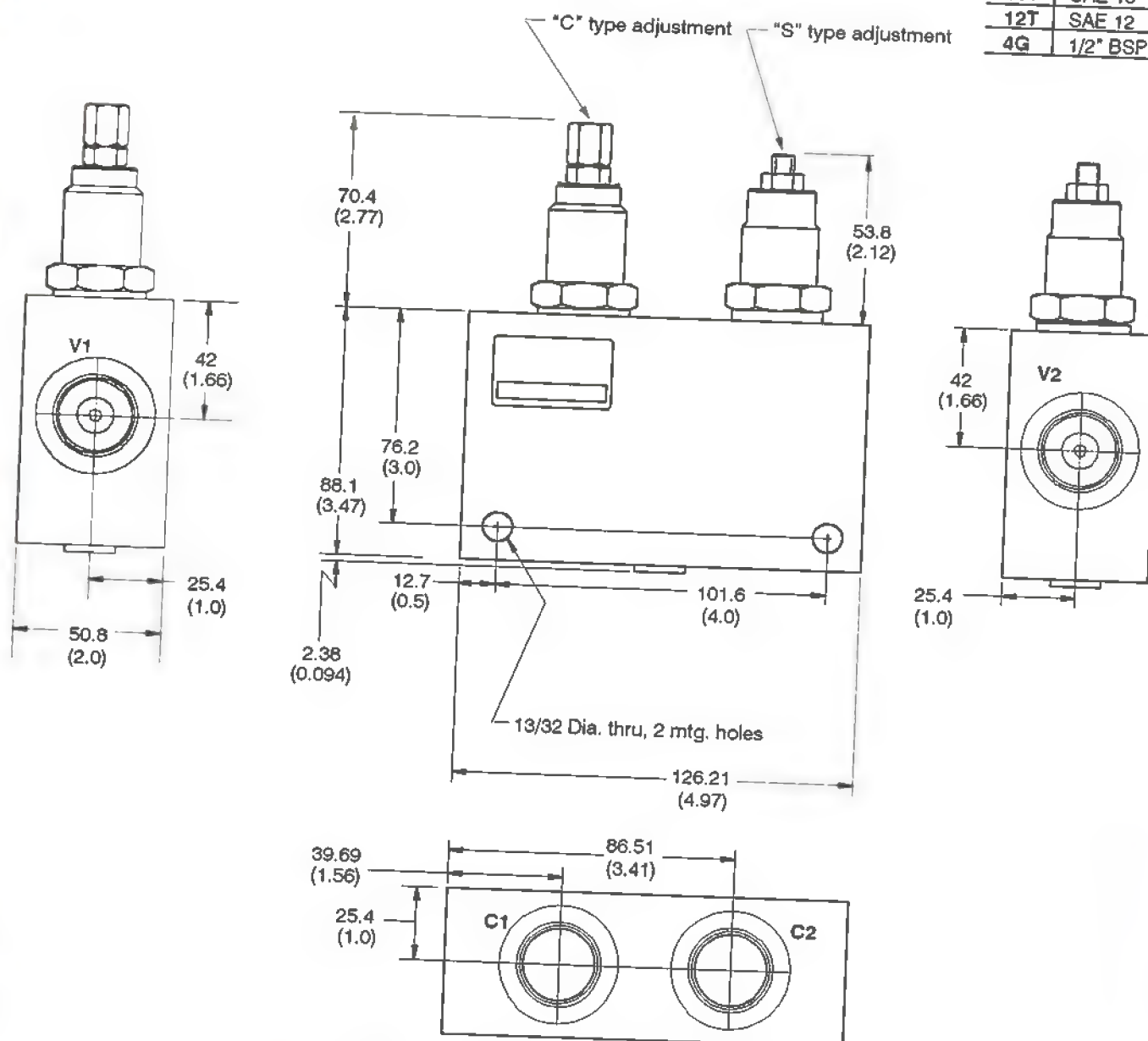
Dual Counterbalance Line Mounted CBV*-12*-*-D

Functional Symbol



Dimensions mm (inch)

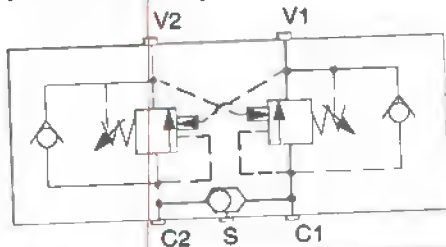
Port Size	C1, C2, V1, V2
10T	SAE 10
12T	SAE 12
4G	1/2" BSPP



Dual Counterbalance Line Mounted w/Integral Shuttle

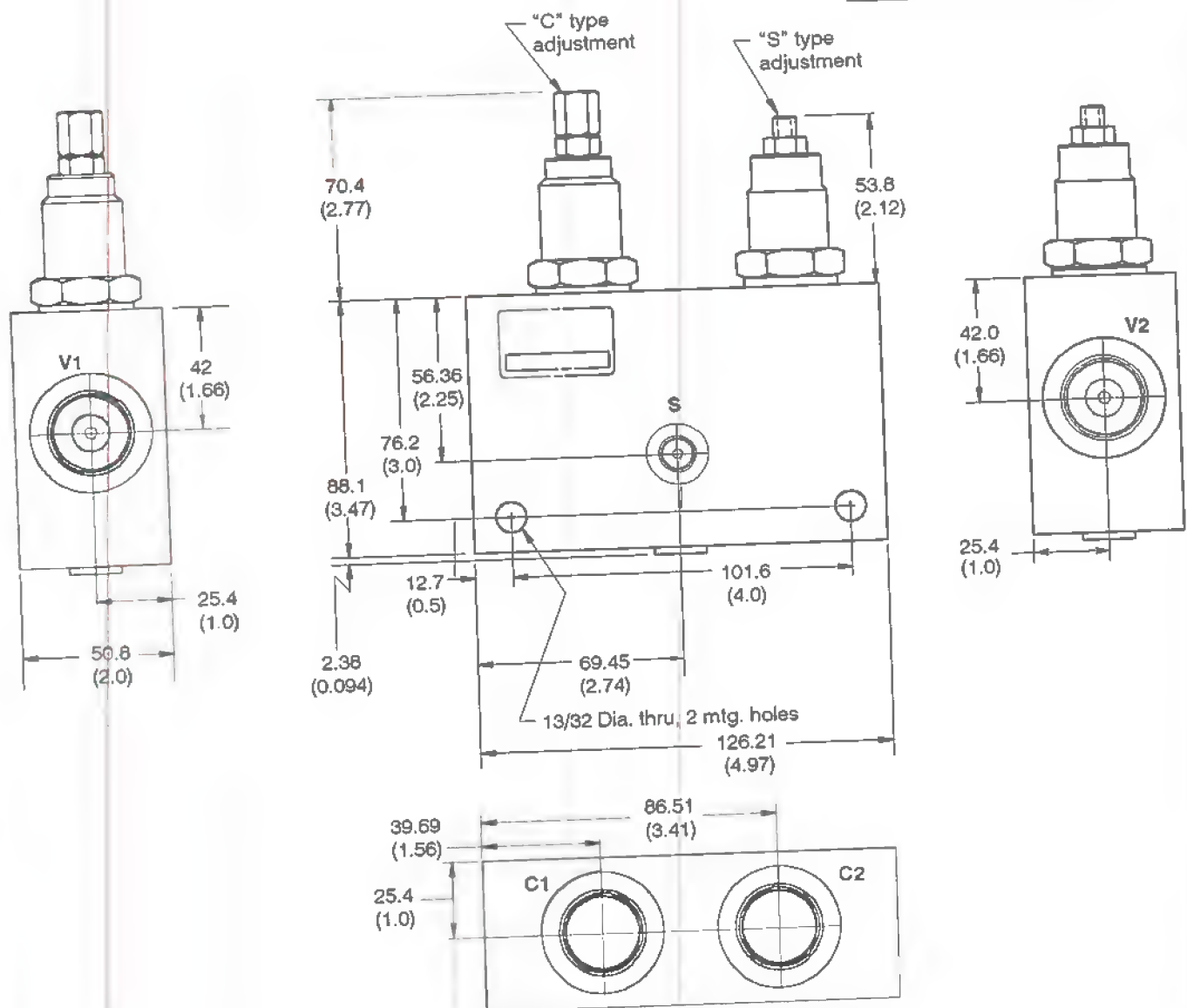
CBV*-12*-*-M

Functional Symbol



Dimensions mm (inch)

Port Size	C1, C2, V1, V2	S
10T	SAE 10	SAE 4
12T	SAE 12	SAE 4
4G	1/2" BSPP	1/4" BSPP



Model Code

RV11 - 12* - * - * * * * - **/**

1 2 3 4 5 6 7 8 9 10

1 Function

RV - Relief Valve

2 Version

3 Size

12 - 12 Size

4 Seals

Blank - Buna "N"

V - Viton

5 Adjustment

S - Screw

C - Cap

K - Knob

6 Valve Housing Material

S - Steel

A - Aluminum

7 Port Size

O - Cartridge Only

4G - 1/2" BSPP

6G - 3/4" BSPP

10T - SAE 10

12T - SAE 12

8 Cavity

Blank - Cavity without undercut

U - Cavity with undercut

9 Pressure Range

15 - 5-103 bar (75-1500 psi)

30 - 10-207 bar (150-3000 psi)

50* - 17-345 bar (250-5000 psi)

* Must be ordered as cartridge only or with an "S" (steel) valve body.

10 Factory Set Cracking Pressure

Within ranges in 9 above

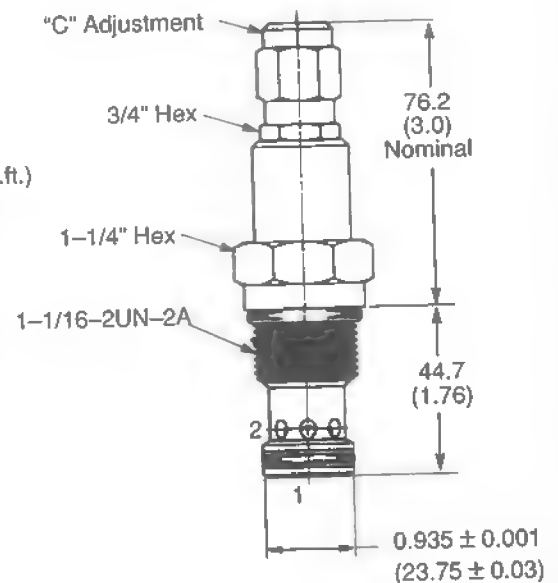
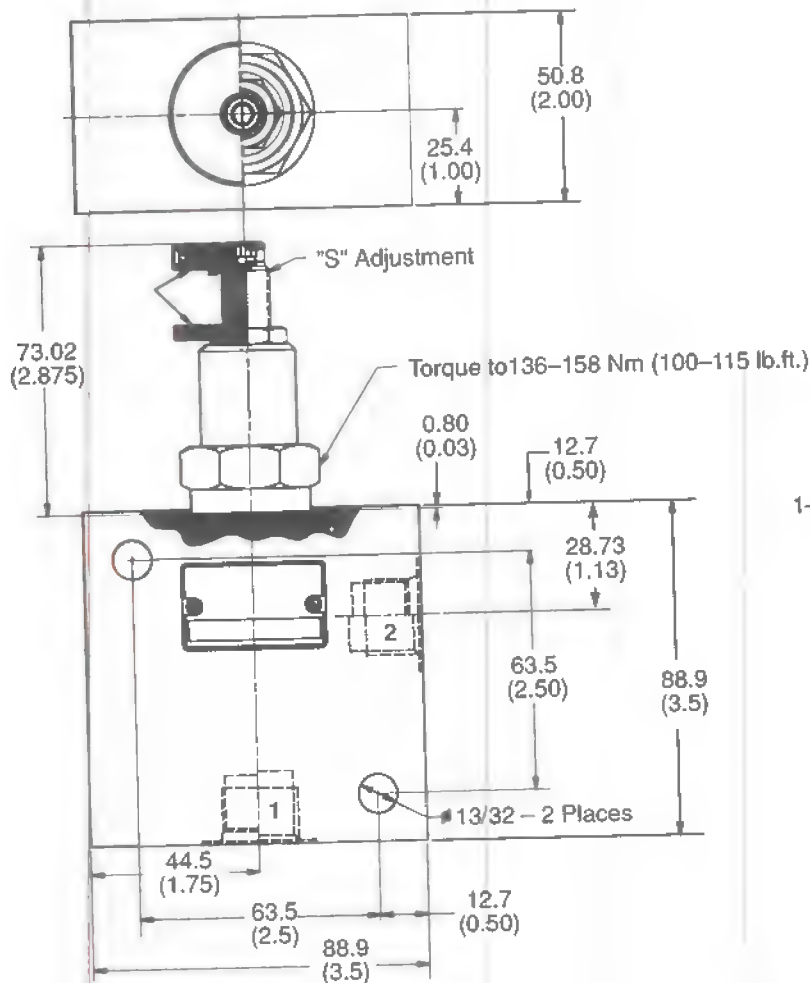
Blank - Normal factory setting at approximate mid-range

User requested settings in 3.45 bar (50 psi) steps, coded as in the following examples:

10 - 68.9 bar (1000 psi)

10.5 - 72.4 bar (1050 psi)

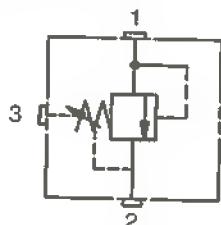
Dimensions



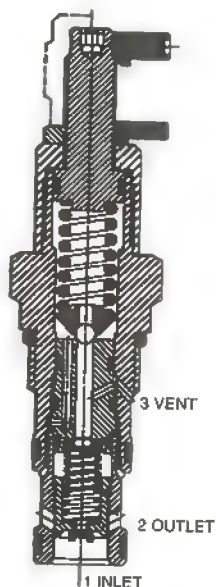
Relief Valve, Vented

VRV11-12

Functional Symbol

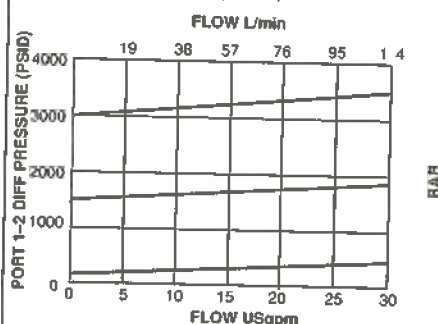


Sectional View



Pressure Override Characteristics

28 cSt (132 SSU) @ 38° C (100° F)



Description

The VRV11-12 is a pilot operated, sliding spool, adjustable, cartridge type vented relief valve. The valve is designed for use as a pressure limiting device in hydraulic circuits which can be operated remotely. The sliding spool design smoothly regulates pressure in any hydraulic system and provides low hysteresis.

Operation

In its normally closed state, the valve allows flow from Port 1 to Port 2 when Port 3 is vented, or the main spring setting is achieved.

Features

- NFPA fatigue and endurance rated for 345 bar (5000 psi) maximum pressure.
- All operating parts are hardened steel, ground, honed and lapped for long life and low leakage.
- Standard bodies available in aluminum or steel.
- Cartridge design for maximum flexibility and minimal manifold space requirements.
- Pilot operated design for fast response with low hysteresis.
- All exposed surfaces are plated to resist corrosion.
- High flow capability in a compact size.
- Desired setting may be locked down.
- Aluminum knob option available.

Ratings

Maximum pressure	345 bar (5000 psi)
	137 bar (20,000 psi) burst pressure
Sequence crack pressure ranges	75-1500, 150-3000 & 250-5000 psi
Crack pressure set with	0.25 USgpm from port "1" to "2"
Reseat pressure	more than 90% of crack pressure
Hysteresis	less than 45 psi
Internal leakage	11.6 cu.in./min (189 ml/min) @80% crack press
Overshoot	less than 15% of max. press. range with flow step of 30 USgpm at pressure rise rate of 100,000 psi/sec
Repeatability	+/- 1% maximum pressure range
Rated flow	30 USgpm (114 L/min)
Operating media temperature range	-40° C to 120° C (-40° to 184° F)

Cavity

C-12-3S

Fluids

All general purpose hydraulic fluids such as MIL-H-5606, SAE 10, SAE 20, etc. Refer to Vickers data sheet I-286-S.
Fluid cleanliness ISO 4406, class 16/13 or cleaner

Mass, Cartridge Only

0.4kg (0.89 lb)

Model Code

VRV11 - 12* - * - *** - **/**

1 2 3 4 5 6 7 8 9

1 Function

VRV - Vented Relief Valve

2 Version

3 Size

12 - 12 Size

4 Size

Blank - Buna "N"
V - Viton

5 Adjustment

S - Screw
C - Cap
K - Knob

6 Valve Housing Material

S - Steel
A - Aluminum

7 Port Size

O - Cartridge Only
4G - $\frac{1}{2}$ " BSPP
6G - $\frac{3}{4}$ " BSPP
10T - SAE 10
12T - SAE 12

8 Pressure Range

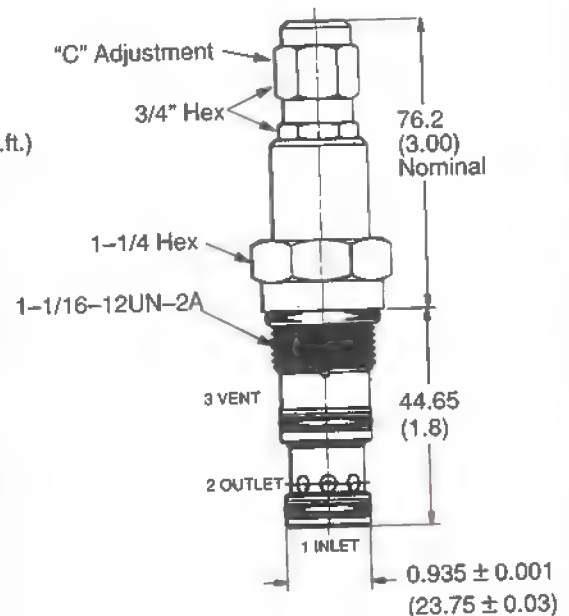
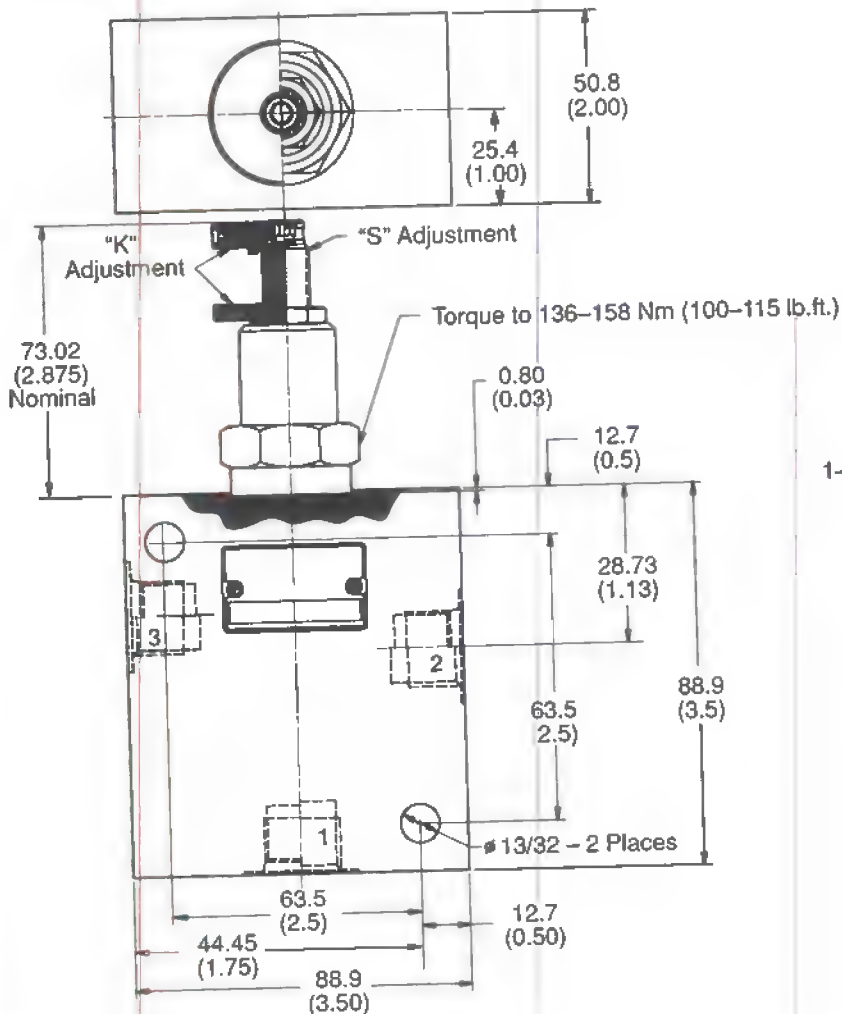
15 - 5-103 bar (75-1500 psi)
30 - 10-207 bar (150-3000 psi)
50* - 17-345 bar (250-5000 psi)

* Must be ordered as cartridge only or with an "S" (steel) valve body.

9 Factory Set Cracking Pressure

Within ranges in 8 above
Blank - Normal factory setting at approximate mid-range
User requested settings in 3.45 bar (50 psi) steps, coded as in the following examples:
10 - 68.9 bar (1000 psi)
10.5 - 72.4 bar (1050 psi)

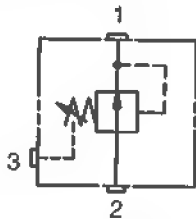
Dimensions



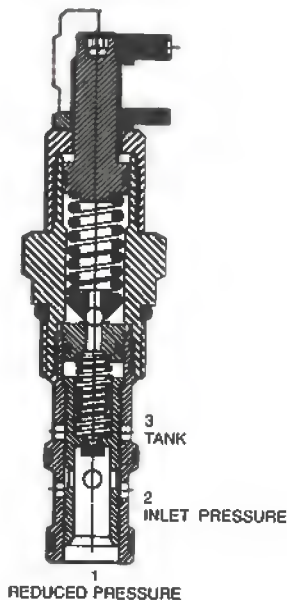
Pressure Reducing Valve, Pilot Operated

PRV11-12

Functional Symbol

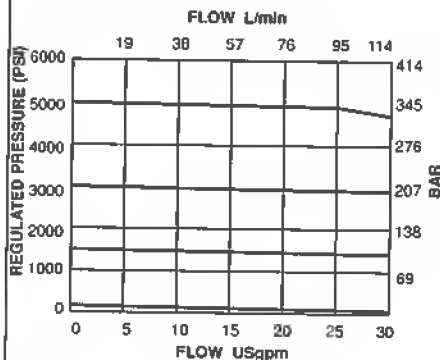


Sectional View



Reduced Pressure Characteristics

20cSi (132 SSU) @ 38° C (100° F)



Description

The PRV11-12 is a screw-in cartridge type, pilot operated, sliding spool, adjustable pressure reducing valve.

Operation

The PRV11-12 is normally open, allowing flow from Port 2 to Port 1 (Port 3 must be vented). Once the pressure setting is reached at Port 1, the spool shifts to restrict the inlet flow at Port 2, which regulates the pressure at Port 1.

Features

- NFPA fatigue and endurance rated for 345 bar (5000 psi) maximum pressure.
- All operating parts are hardened steel, ground, honed and lapped for long life and low leakage.
- Standard bodies available in aluminum or steel.
- Cartridge design for maximum flexibility and minimal manifold space requirements.
- Pilot operated design for fast response with low hysteresis.
- All exposed surfaces are plated to resist corrosion.
- High flow capability in a compact size.
- Desired setting may be locked down.
- Aluminum knob option available.

Ratings

Maximum pressure 345 bar (5,000 psi) max.

Rated flow 114 L/min (30 USgpm)

Reduced pressure adjustment range See "Model Code"

Internal leakage 189 ml/min (11.6 cu. in.)

Reduced pressure characteristics See "Reduced Press. Characteristics"

Operating media temperature range -40° to 120° C (-40° to 248° F)

Cavity

C-12-3S

Fluids

All general purpose hydraulic fluids such as MIL-H-5606, SAE 10, SAE 20, etc. Refer to Vickers data sheet I-286-S.

Fluid cleanliness ISO 4406, class 16/13 or cleaner

Mass, Cartridge Only

0.4kg (0.89 lb)

Model Code

PRV11 - 12* - * - *** - **/**

1 2 3 4 5 6 7 8 9

1 Function

PRV - Pressure Reducing Valve

2 Version

3 Size

12 - 12 Size

4 Seals

Blank - Buna "N"
V - Viton

5 Adjustment

S - Screw
C - Cap
K - Knob

6 Valve Housing Material

S - Steel
A - Aluminum

7 Port Size

0 - Cartridge only
4G - 1/2" BSPP
6G - 3/4" BSPP
10T - SAE 10
12T - SAE 12

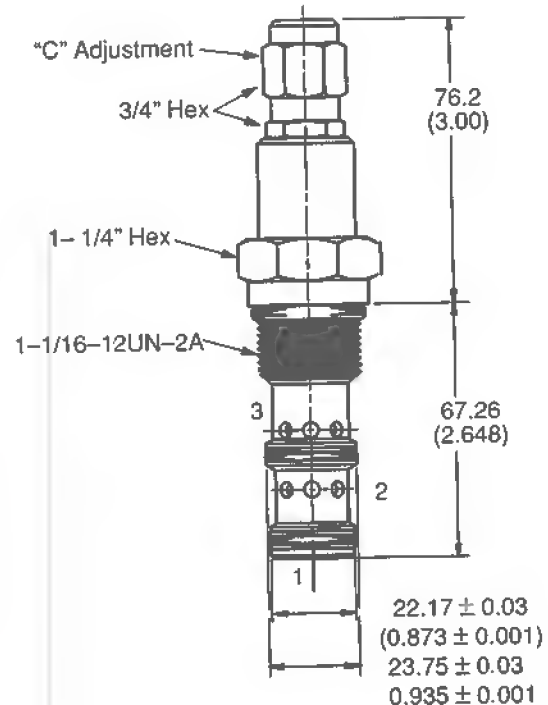
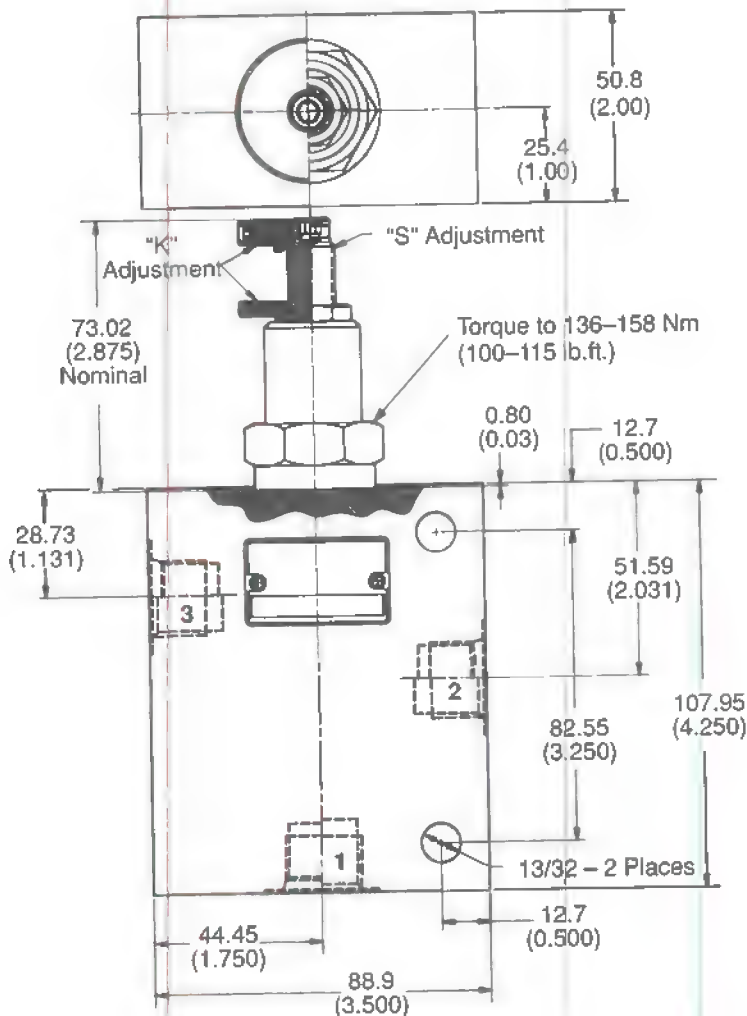
8 Pressure Range

15 - 10-103 bar (150-1500 psi)
30 - 17-207 bar (250-3000 psi)
50* - 24-345 bar (350-5000 psi)
* Must be ordered with steel valve body

9 Factory Set Reduced Pressure

Within ranges in 8 above
Blank - Normal factory setting at approximate mid-range
User requested settings in 3.45 bar (50 psi) steps, coded as in the following examples:
10 - 68.9 bar (1000 psi)
10.5 - 72.4 bar (1050 psi)

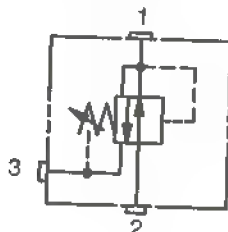
Dimensions



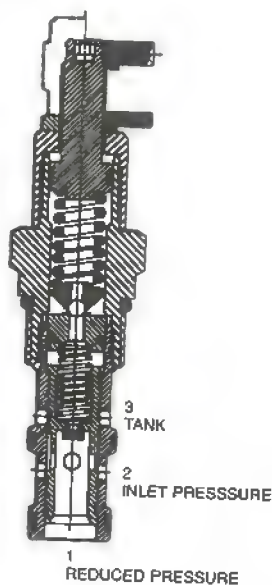
Pressure Reducing/Relieving Valve

PRV12-12

Functional Symbol

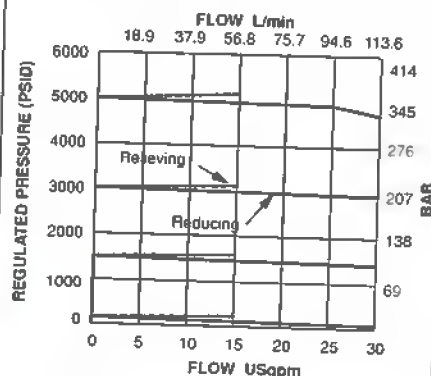


Sectional View



Reduced Pressure Characteristics

20 cSt (132 SSU) @ 38° C (100° F)



Description

The PRV12-12 is a pilot operated, sliding spool, adjustable cartridge type pressure reducing and relieving valve. This valve maintains a constant secondary (lower) pressure in hydraulic subsystems regardless of pressure variations in the primary system. In addition to the reducing function, this valve also provides a flow path from the reduced pressure port to the tank port. If pressure in the secondary circuit exceeds the desired pressure, the valve opens this flow path to relieve excess pressure to tank.

Operation

The PRV12-12 is normally open, allowing flow from Port 2 to Port 1 (Port 3 must be vented). Once the pressure setting is reached at Port 1, the spool shifts to restrict the inlet flow at port 2, which regulates the pressure at Port 1. If pressure at Port 1 exceeds the predetermined setting of the valve, the spool will shift further and relieve excess pressure through Port 3.

Features

- NFPA fatigue and endurance rated for 345 bar (5000 psi) maximum pressure.
- All operating parts are hardened steel, ground, honed and lapped for long life and low leakage.
- Standard bodies available in aluminum or steel.
- Pilot operated design for fast response with low hysteresis
- Cartridge design for maximum flexibility and minimal manifold space requirements.
- All exposed surfaces are plated to resist corrosion.
- High flow capability in a compact size.
- Desired setting may be locked down.
- Aluminum knob option available.

Ratings

Maximum pressure	345 bar (5000 psi) Port 2 to 1 @ 57 L/min (15 USgpm) 207 bar (3000 psi) Port 2 to 1 @ 114 L/min (30 USgpm)
------------------	---

Reduced pressure adjustment range See "Model Code"

Rated flow 114 L/min (30 USgpm)

Internal leakage 1.0 L/min (0.30 USgpm)

Reduced press. characteristics See "Reduced Press. Characteristics"

Operating media temperature range -40° to 120° C (-40° to 248° F)

Cavity

C-12-3

Fluids

All general purpose hydraulic fluids such as MIL-H-5606, SAE 10, SAE 20, etc. Refer to Vickers data sheet I-286-S.

Fluid cleanliness ISO 4406, class 16/13 or cleaner

Mass, Cartridge Only

0.4kg (0.89 lb)

Model Code

PRV12 - 12* - * - *** - **/**

- ## 1 Function

PRV – Pressure Reducing Valve

- ## 2 Version

- ### 3 Size

12 - 12 Size

- #### 4 Seals

Blank - Buna "N"
V - Viton

- ### 5. Valve Housing Material

S - Steel
A - Aluminum

- ## 6 Adjustment

S - Screw
C - Cap
K - Knob

- ### 7 Port Size

4G - 1/2" BSPP
6G - 3/4" BSPP
10T - SAE 10
12T - SAE 12

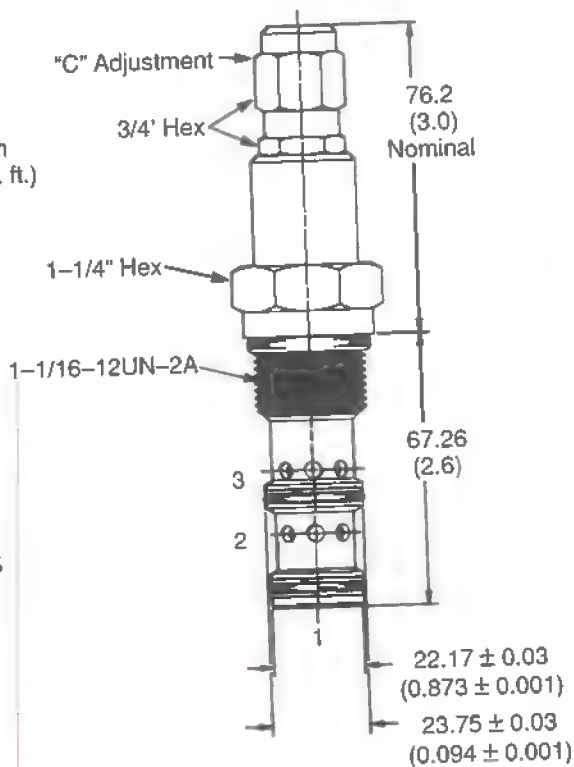
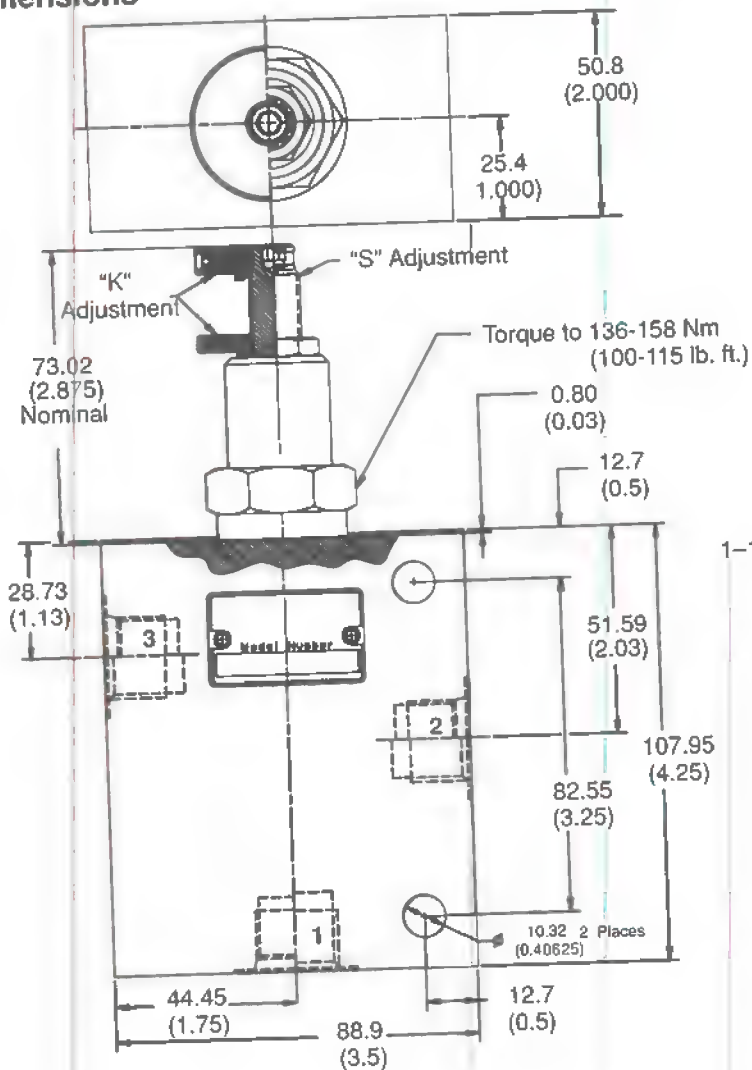
- ### 8 Pressure Range

15 - 10-103 bar (150-1500 psi)
30 - 17-207 bar (250-3000 psi)
50* - 24-345 bar (350-5000 psi)
* Must be ordered as a cartridge only or
with an "S" (Steel) valve body

- 9. Factory Set Reduced Pressure**

Blank – Normal factory setting at approximate mid-range
User requested settings in 3.45 bar (50 psi) steps, coded as in the following examples:
10 – 68.9 bar (1000 psi)
10.5 – 72.4 bar (1050 psi)

Dimensions

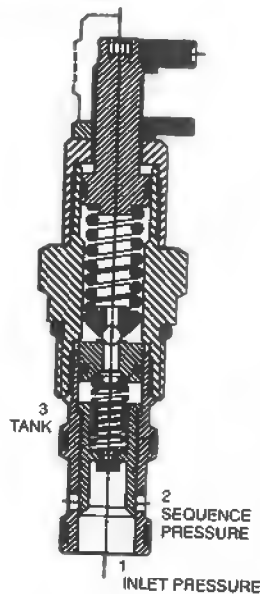


Pressure Sequence Valve, Internally Piloted

PSV11-12

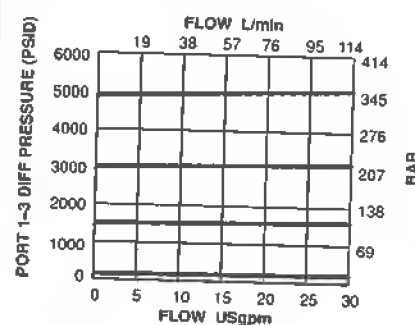


Sectional View



Sequence Pressure Override Characteristics

28 cSt (132 SSU) @ 38° C (100° F)



Description

The PSV11-12 is a pilot operated, sliding spool, adjustable, cartridge type pressure sequence valve. This valve, which is internally piloted, controls the sequence of operations of two or more actuators.

Operation

The PSV11-12 valve remains normally closed until a predetermined pressure is reached at port 1, which then allows flow to port 2 (port 3 must be vented).

Features and Benefits

- NFPA fatigue and endurance rated for 345 bar (5000 psi) maximum pressure.
- All operating parts are hardened steel, ground, honed and lapped for long life and low leakage.
- Standard bodies available in aluminum or steel.
- Cartridge design for maximum flexibility and minimal manifold space requirements.
- Pilot operated design for fast response with low hysteresis.
- All exposed surfaces are plated to resist corrosion.
- High flow capability in a compact size.
- Desired setting may be locked down.
- Aluminum knob option available.

Ratings

Maximum pressure	345 bar (5000 psi)
Sequence crack pressure ranges	75-1500, 150-3000 & 250-5000 psi
Crack pressure set with	0.25 USgpm from port "1" to "2"
Reseat pressure	more than 90% of crack pressure.
Hysteresis	less than 45 psi
Internal leakage	11.6 cu.in./min (189 ml/min) @80% crack press.
Overshoot	less than 15% of max. press. range with flow step of 30 USgpm at pressure rise rate of 100,000 psi/sec.
Repeatability	+/- 1% maximum pressure range
Rated flow	30 USgpm (114 L/min)
Operating media temperature range	-40° to 120° C (-40° to 248° F)

Cavity

C-12-3S

Fluids

All general purpose hydraulic fluids such as MIL-H-5606, SAE 10, SAE 20, etc. Refer to Vickers data sheet I-286-S.
Fluid cleanliness ISO 4406, class 16/13 or cleaner

Mass, Cartridge Only

0.4 kg (0.89 lb)

Model Code

PSV11-12*-*-***-**-**

1 Function

PSV – Pressure sequence valve

2 Version

3 Size

12 - Size 12

4 Seals

Blank – Buna "N"
V – Viton

5 Adjustment

S - Screw
C - Cap
K - Knob

6 Valve Housing Material

S - Steel
A - Aluminum

7 Port Size

O - Cartridge only
4G - 1/2" BSPP
6G - 3/4" BSPP
10T - SAE 10
12T - SAE 12

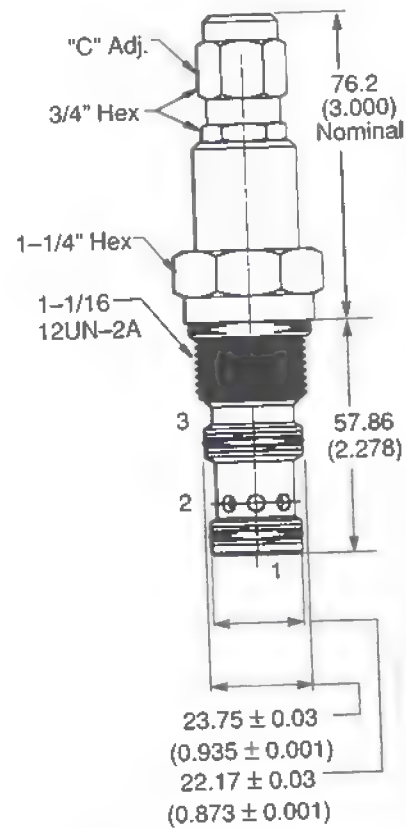
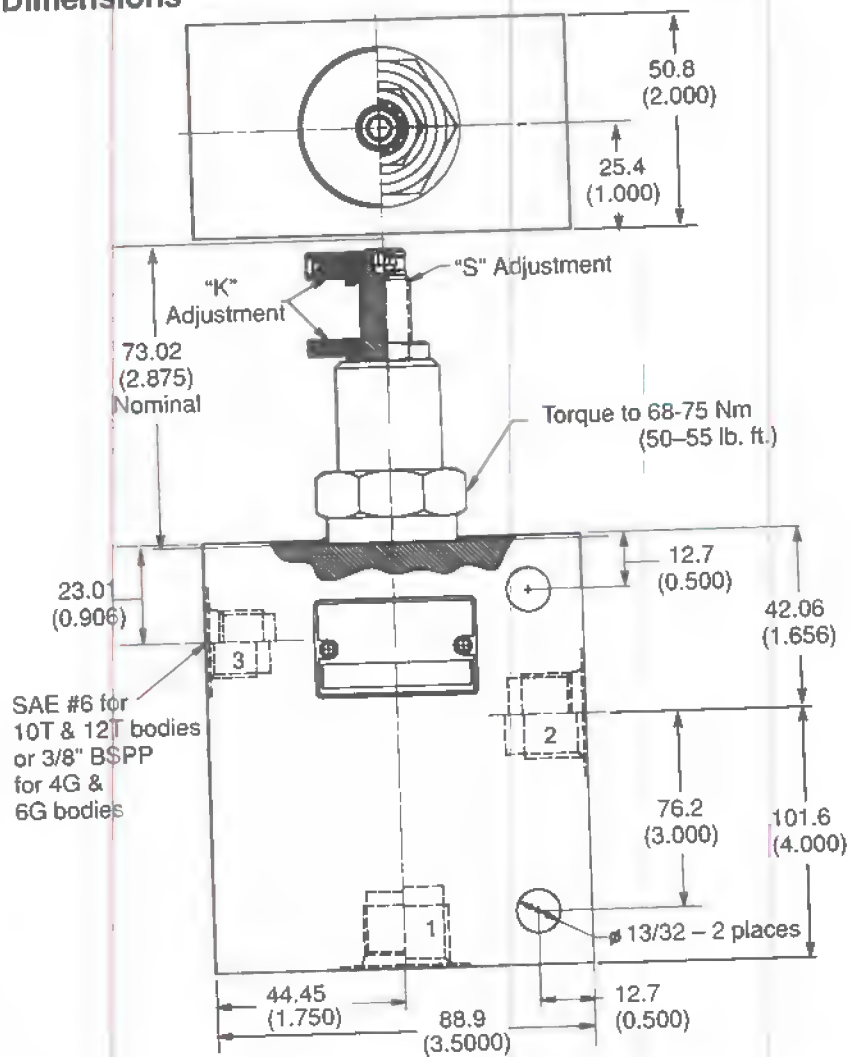
8 Pressure Range

15 - 5-104 bar (150-1500 psi)
30 - 10-207 bar (250-3000 psi)
50* - 17-345 bar (350-5000 psi)
* Must be ordered as a cartridge only or
with an "S" (Steel) valve body.

[9] Factory Set Cracking Pressure

Within ranges in **8** above
Blank – Normal factory setting at
 approximate mid-range
 User requested settings in 3.45 bar
 (50 psi) steps, coded as in the
 following examples:
10 – 68.9 bar (1000 psi)
10.5 – 72.4 bar (1050 psi)

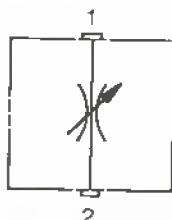
Dimensions



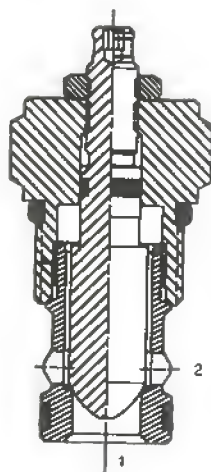
Flow Control Valve

FCV11-12

Functional Symbol

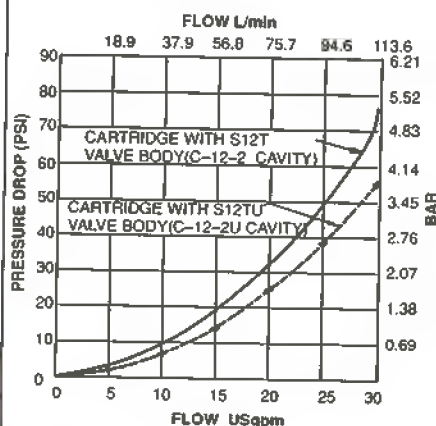


Sectional View



Pressure Drop Characteristics

28 CST (132 SSU) @ 38° C (100° F)



Description

The FCV11-12 is a screw-in cartridge type, direct acting, adjustable needle valve.

Operation

This valve is non-pressure compensated. Flow is controlled in either direction, from full flow to tight shut-off, by turning the adjustment feature clockwise.

Features

- NFPA fatigue and endurance rated for 345 bar (5000 psi) maximum pressure.
- All operating parts are hardened steel, ground, honed and lapped for long life and low leakage.
- Standard bodies available in aluminum or steel.
- Cartridge design for maximum flexibility and minimal manifold space requirements.
- All exposed surfaces are plated to resist corrosion.
- High flow capability in a compact size.
- Desired setting may be locked down.
- Aluminum knob option available.

Ratings

Maximum pressure	345 bar (5000 psi)
Rated flow	114 L/min (30 USgpm)
Internal leakage	5 drops/min @ 345 bar (5000 psi)
Pressure drop characteristics	95 L/min (25 USgpm) @ 3500 psid
Operating media temperature range	-40° C to 120° C (40° F to 184° F)

Cavity

C-12-2, C-12-2U

Fluids

All general purpose hydraulic fluids such as MIL-H-5606, SAE 10, SAE 20, etc. Refer to Vickers data sheet I-286-S.
Fluid cleanliness ISO 4406, class 16/13 or cleaner

Mass, Cartridge Only

0.24 kg (0.54 lb)

Model Code

FCV11 - 12* - * - * * * - NV

1 2 3 4 5 6 7 8 9

1 Function

FCV - Flow Control Valve

2 Version

3 Size

12 - 12 Size

4 Seals

Blank - Buna "N"
V - Viton

5 Adjustment

S - Screw

6 Valve Housing Material

S - Steel*

A - Aluminum

* For operating pressures above 207 bar (3000 psi)

7 Port Size

O - Cartridge Only

4G - 1/2" BSPP

6G - 3/4" BSPP

10T - SAE 10

12T - SAE 12

8 Cavity

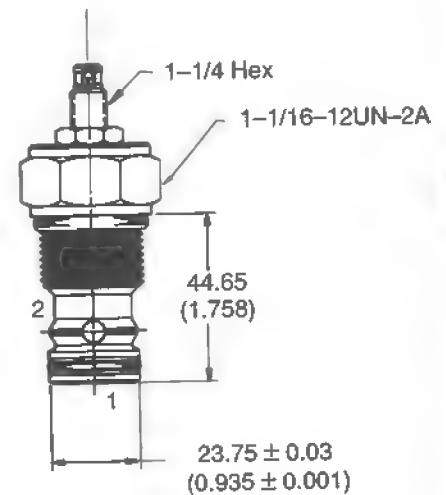
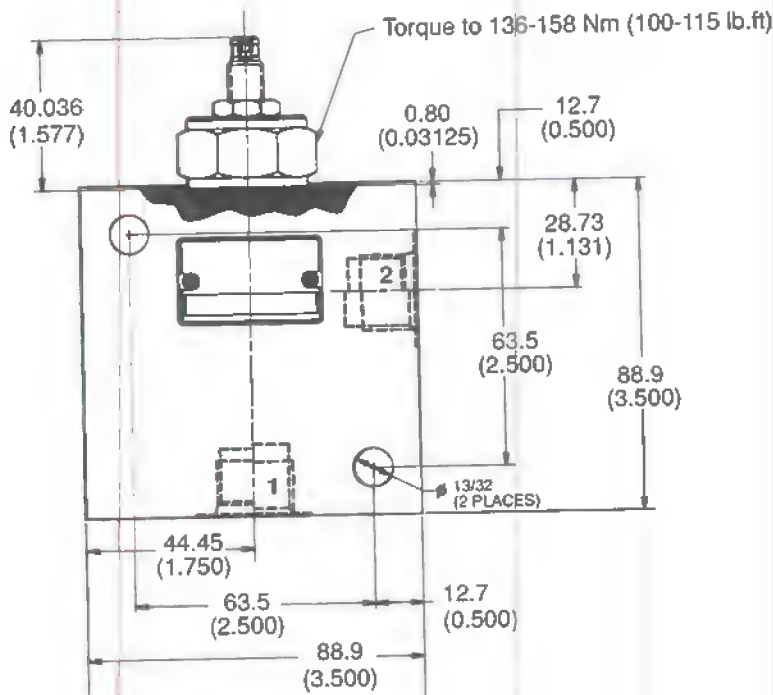
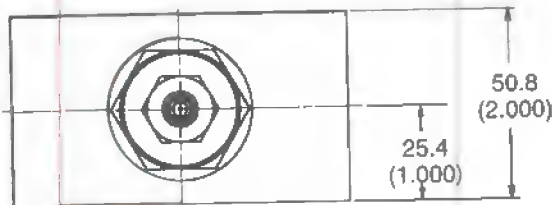
Blank - Cavity without undercut

U - Cavity with undercut

9 Valve Type

NV - Needle Valve (Adjustable)

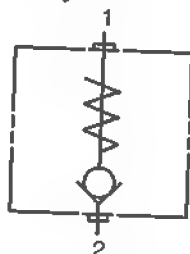
Dimensions



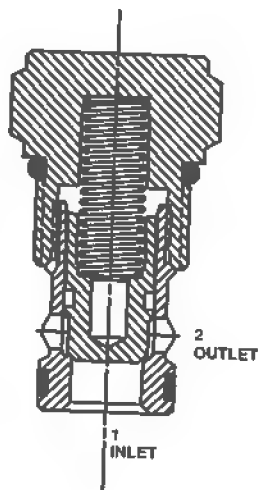
Check Valve

CV11-12

Functional Symbol

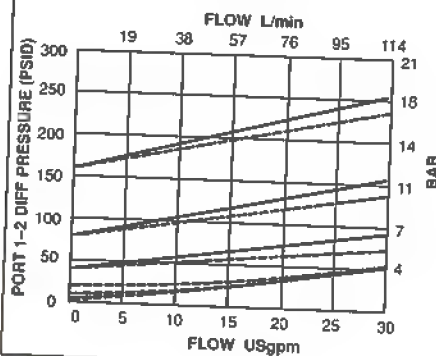


Sectional View



Pressure Drop Characteristics

28 cSI (132 SSU) @ 38° C (100° F)



Description

The CV11-12 is a cartridge type, direct acting, poppet style, hydraulic check valve. This valve is used to block flow or as a load holding device.

Operation

This check valve allows flow from Port 1 to Port 2 once the spring bias is overcome and will not allow flow in the reverse direction.

Features

- NFPA fatigue and endurance rated for 345 bar (5000 psi) maximum pressure.
- All operating parts are hardened steel, ground, honed and lapped for long life and low leakage.
- Standard bodies available in aluminum or steel.
- Cartridge design for maximum flexibility and minimal manifold space requirements.
- All exposed surfaces are plated to resist corrosion.
- High flow capability in a compact size.
- Desired setting may be locked down.
- Aluminum knob option available.

Ratings

Maximum pressure	345 bar (5000 psi)
Rated flow	See "Pressure Drop Characteristics"
Internal leakage	5 drops/min at 345 bar (5000 psi)
Pressure drop characteristics	See "Pressure Drop Characteristics"
Reseat pressure	more than 90% of crack pressure
Crack pressures	0.17 bar (2.5 psi) 0.35 bar (5.0 psi) 0.69 bar (10.0 psi) 1.38 bar (20.0 psi) 2.75 bar (40.0 psi) 5.5 bar (80.0 psi) 11 bar (160 psi)
Hysteresis	less than 45 psi
Operating media temperature range	-40° to 120° C (-40° to 184° F)

Cavity

C-12-2 or C-12-2U

Fluids

All general purpose hydraulic fluids such as MIL-H-5606, SAE 10, SAE 20, etc. Refer to Vickers data sheet I-286-S.

Fluid cleanliness ISO 4406, class 16/13 or cleaner

Mass, Cartridge Only

0.24 kg (0.54 lb)

Model Code

CV11-12*-P-****-**

1 2 3 4 5 6 7 8 9

1 Function

CV - Check Valve

2 Version

3 Size

12 - 12 Size

4 Seals

Blank - Buna "N"
V - Viton

5 Style

P - Poppet

6 Valve Housing Material

S - Steel*
A - Aluminum
* For operating pressures
above 207 bar (3000 psi)

7 Port Size

O - Cartridge Only
4G - 1/2" BSPP
6G - 3/4" BSPP
10T - SAE 10
12T - SAE 12

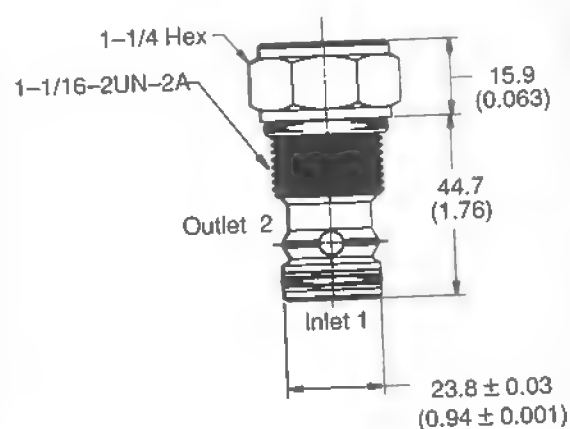
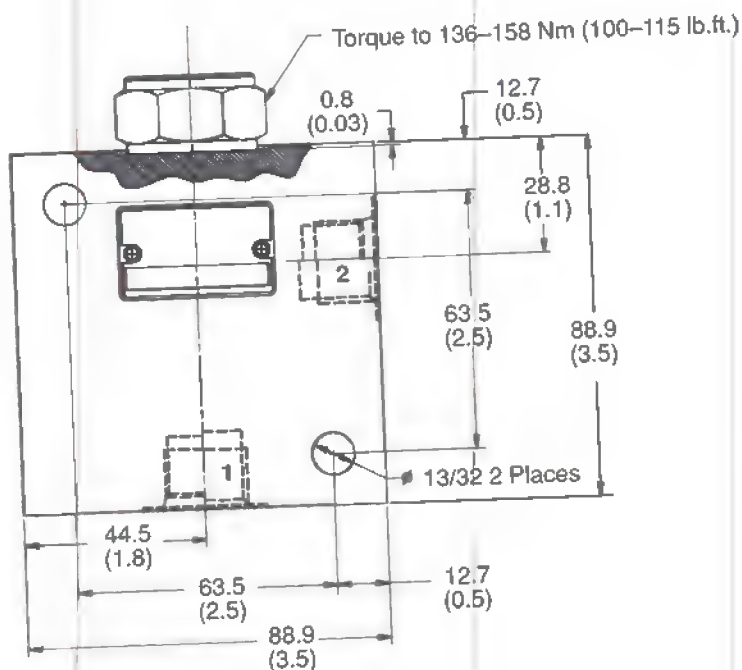
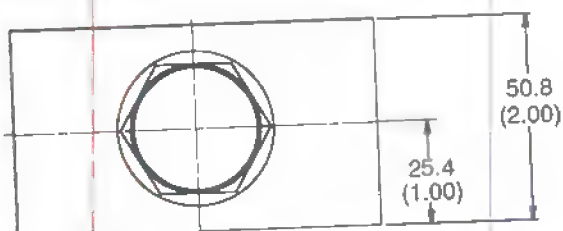
8 Cavity

Blank - Cavity without undercut
U - Cavity with undercut

9 Cracking Pressure

2.5 - 0.17 bar (2.5 psi)
5.0 - 0.35 bar (5.0 psi)
10 - 0.69 bar (10.0 psi)
20 - 1.38 bar (20.0 psi)
40 - 2.75 bar (40.0 psi)
80 - 5.5 bar (80.0 psi)
160 - 11 bar (160 psi)

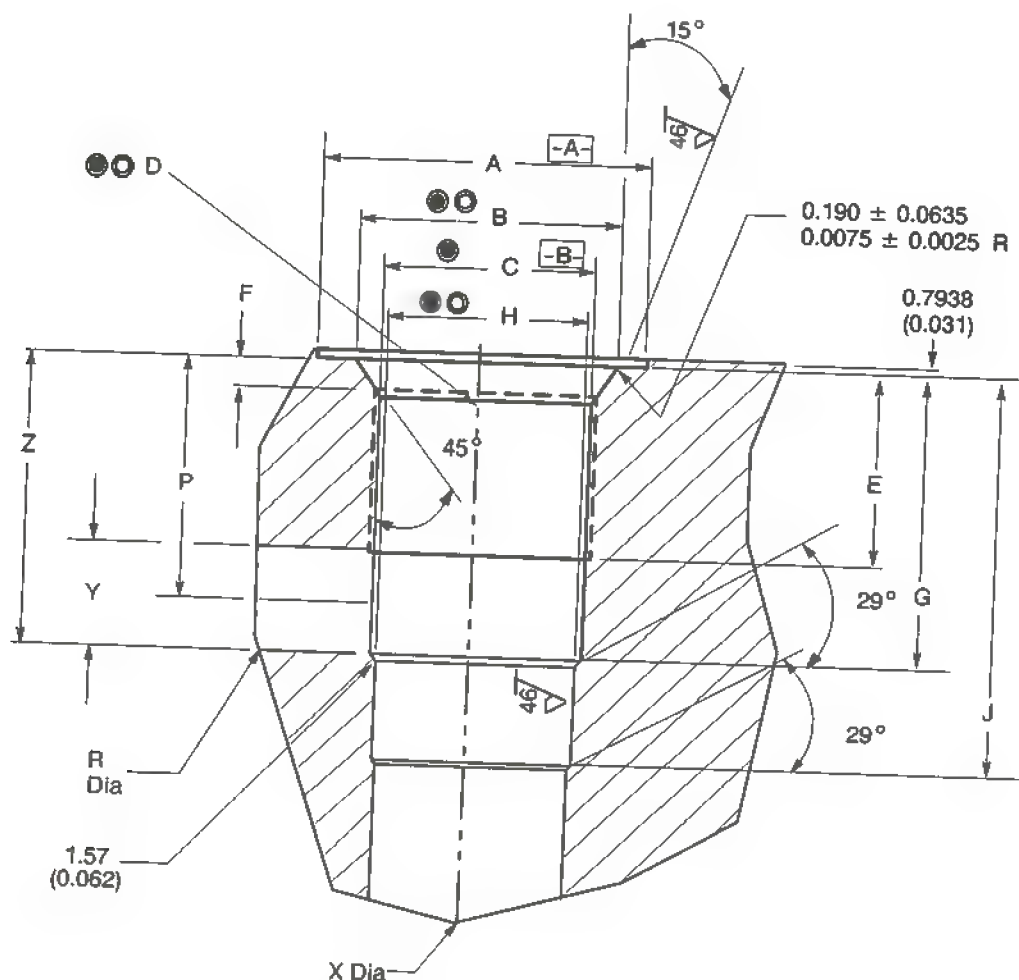
Dimensions



Standard Cavity Dimensions

C-12-2, 2-Way Cavity

mm (inch)



Cavity

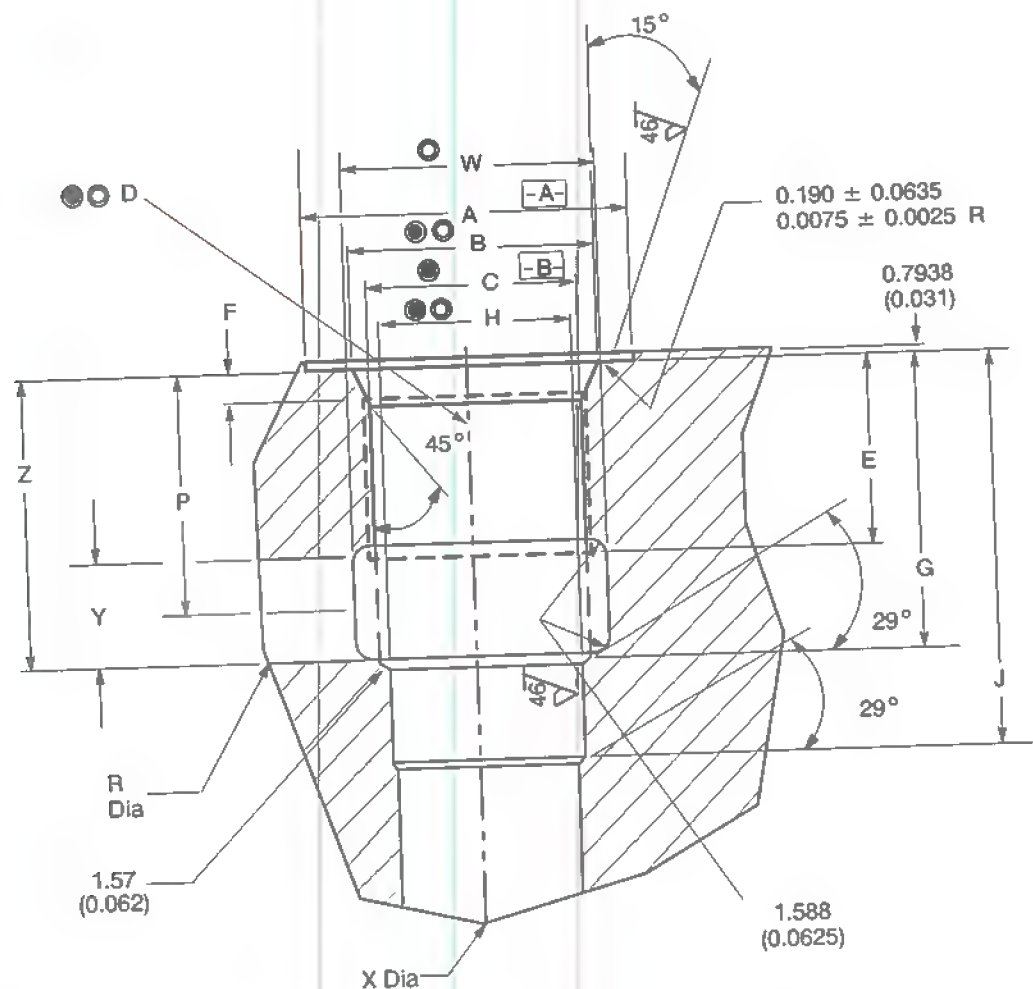
Cavity	A Spotface	B .002	C .002	D Thread thd. class 2B	E Full Thread	F	G	H ± .001	J	P
C-12-2	38.1 (1.5000)	29.160 (1.148)	24.765 (0.975)	26.988 (1 1/16-12)	22.225 (0.875)	3.302/3.683 (0.130/0.145)	34.925 (1.375)	23.825 (0.938)	46.355 (1.825)	27.94 (1.100)
R Max. Dia.	X Max. Dia.	Y Max. Dia.	Z Max. Dia.							
12.7 (0.500)	22.225 (0.875)	12.7 (0.500)	34.29 (1.350)							

- These diameters ☒ .0508 mm (.002 inch) B unless otherwise specified.
- These diameters ☐ .0254 mm (.001 inch) A unless otherwise specified.

Standard Cavity Dimensions

C-12-2U, 2-Way Cavity, with Undercut

mm (inch)



Cavity

Cavity	A Spotface	B .002	C .002	D Thread thd. class 2B	E Full Thread	F	G	H ± .001	J	P
C-12-2U	38.1 (1.5000)	29.160 (1.148)	24.765 (0.975)	26.988 (1 1/16-12)	22.225 (0.875)	3.302/3.683 (0.130/0.145)	34.925 (1.375)	23.825 (0.938)	46.355 (1.825)	27.94 (1.100)

R Max. Dia.	W	X Max. Dia.	Y Max. Dia.	Z Max. Dia.
12.7 (0.500)	30.835 (1.214)	22.225 (0.875)	12.7 (0.500)	34.29 (1.350)

- ☒ These diameters 0.0508 mm (.002 inch) B unless otherwise specified.
☐ These diameters 0.0254 mm (.001 inch) A unless otherwise specified.

mm (inch)



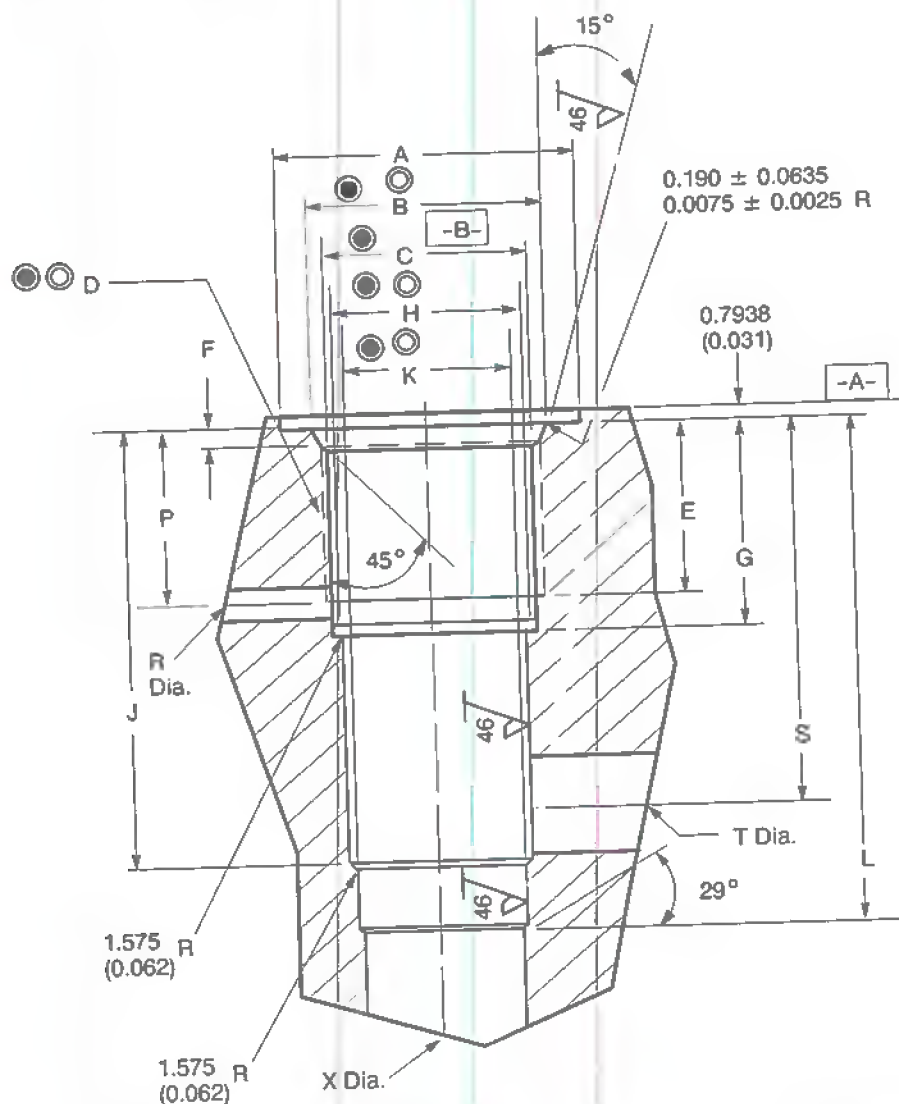
● These diameters ∇ .0508 mm (.002 inch) B unless otherwise specified.

○ These diameters \sqcup .0254 mm (.001 inch) A unless otherwise specified.

Standard Cavity Dimensions

C-12-3S, 3-Way Short Cavity

mm (inch)



Cavity

Cavity	A Spotface	B .002	C .002	D Thread thd. class 2B	E Full Thread	F	G	H ± .001	J	K ± .001
C-12-3S	38.1 (1.5000)	29.160 (1.148)	24.765 (0.975)	26.988 (1 1/16-12)	22.225 (0.875)	3.302/3.683 (0.130/0.145)	25.4 (1.000)	23.825 (0.938)	48.26 (1.900)	22.25 (0.876)

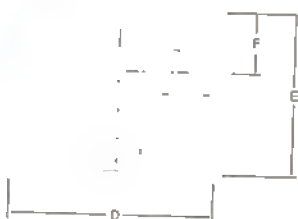
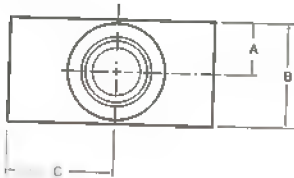
L	P	R Max. Dia.	S	T Max. Dia.	X Max. Dia.
59.69 (2.350)	22.23 (0.875)	4.826 (0.190)	41.275 (1.625)	12.7 (0.500)	20.625 (0.812)

- These diameters $\frac{1}{16}$.0508 mm (.002 inch) B unless otherwise specified.
 ○ These diameters $\frac{1}{16}$.0254 mm (.001 inch) A unless otherwise specified.

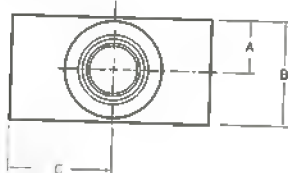
Fatigue Rated Housings - Series 12

NFPA pressure rated (10 million cycle fatigue rating to 207 bar (3000 psi) max.)

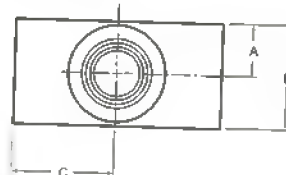
C-**-2



C-**-3



C-**-3S



mm (inch)

Cavity	A	B	C	D	E	F	G
C-12-2	25.4 (1.000)	50.8 (2.000)	44.45 (1.750)	88.9 (3.500)	88.9 (3.500)	28.73 (1.131)	—
C-12-3	25.4 (1.000)	50.8 (2.000)	44.45 (1.750)	88.9 (3.500)	107.95 (4.250)	51.58 (2.031)	28.73 (1.131)
C-12-3S	25.4 (1.000)	50.8 (2.000)	44.45 (1.750)	88.9 (3.500)	101.6 (4.00)	42.06 (1.656)	23.01 (.906)

Port 1	Port 2	Port 3 working	Port 3 pilot
G 1/2"	G 1/2"	G 1/2"	G 1/4"
G 3/4"	G 3/4"	G 3/4"	G 3/8"
SAE 10	SAE10	SAE 10	SAE 6
SAE 12	SAE12	SAE 12	SAE 6

Weights

Aluminum Housing

2-Way - .88 kg (1.96 lbs)
 3-Way - 1.07 kg (2.38 lbs)
 4-Way - 1.01 kg (2.24 lbs)

Steel Housing *

2-Way - 2.66 kg (5.88 lbs)
 3-Way - 3.23 kg (7.14 lbs)
 4-Way - 3.04kg (6.72lbs)

* For pressures over (210) bar (3000 psi), the steel housing is required

Size 12 Cartridge Valves

Supporting Products

Form Tools

Tooling for Machining Standard Cavities

Customers wishing to manufacture their own housings or manifolds can purchase Vickers cavity tools, designed to ensure exactly the right cavity dimensions and surface finishes. For in-depth advice on the machining of cavities, consult your Vickers sales engineer.

The range covers roughing tools that create the basic shape of the whole cavity, and separate finishing tools for the cylindrical bores, and the spotface plus O-ring recess. Cavity thread forms can be machined from standard tooling available from local tool suppliers.

The following table matches each 12 size cartridge valve with its appropriate cavity size and corresponding data sheet.

For cavity	12 Size Cartridge Valve	Refer to Data Sheet
C-12-2 or C-12-2U	CV11-12 FCV11-12 RV11-12	544 549 547
C-12-3	PRV12-12	545
C-12-3S	PSV11-12 VRV11-12 PRV11-12	546 548 550

Roughing tools

For cavity size	Part number	Description
C-12-2 C-12-2U*	RT-12-2-A-8213	Rougher, Aluminum
C-12-3	RT-12-3-A-8217	Rougher, Aluminum
C-12-3S	RT-12-3S-A-8220	Rougher, Aluminum

Finishing tools

Aluminum

For cavity size	Part number	Description
C-12-2 C-12-2U*	FT-12-2-A-8211 FT-12-2-A-8212 FT-12-2-AS-8214	Finisher for 1" collet Finisher for 3/4" collet Finisher for 3/4" collet, high speed
C-12-3	FT-12-3-A-8215 FT-12-3-A-8216	Finisher for 1" collet Finisher for 3/4" collet
C-12-3S	FT-12-3S-A-8218 FT-12-3S-A-8219	Finisher for 1" collet Finisher for 3/4" collet

Steel

C-12-2 C-12-2U*	FT-12-2-AS-8214	Finisher for 3/4" collet
C-12-3	FT-12-3-AS-8244 FT-12-3-AS-8245	Finisher for 1" collet Finisher for 3/4" collet
C-12-3S	FT-12-3S-AS-8242 FT-12-3S-AS-8243	Finisher for 1" collet Finisher for 3/4" collet

A separate operation is required to machine the C-12-2U cavity. Consult factory.

Seal Kits

Cartridge seal kits, comprising external seals and back-up rings, are the only spare parts available.

For cavity size	Part number	Description
C-12-2 C-12-2U	SK2-12-2 SK2-12V-2	2-way valve Buna-N seal kit 2-way valve Viton seal kit
C-12-3 C-12-3S	SK2-12-3 SK2-12V-3	3-way valve Buna-N seal kit 3-way valve Viton seal kit

Hydraulics, electro-hydraulics, electronics: high performance products with quality standards second to none – for enhanced productivity and economy.

Vickers components and systems are used extensively for in-plant machinery, mobile vehicles, automotive equipment, aerospace and marine applications.

Presented by:

VICKERS
ATRINOVA Company

Air Pilot Operated Directional Control Valve

DG18V-3-*A/B/F(L)-(P2)-(V)-*-60

DG18V-3-*C/N-(V)-*-60



Vickers Incorporated
A TRINOVA Company
5445 Corporate Drive
P. O. Box 302
Troy, Michigan 48007-0302
U.S.A.

Spool Type	Model	Spool
* O	A	617498
	B, C, F	617121
	N	890189
** 1, 11	B, C, F	458263
* 2	A	617120
	B, C, F	617118
	N	617126
**** 22	A	617122
*** 3, 31	B, C, F	617124
33	B, C, F	617123
* 6	A	890188
6	B, C, F	617119
	N	617341
**** 7	A	458151
7	B, C, F	617125
***** 8	B, C, F	458950

SPOOL ASSEMBLY NOTE:

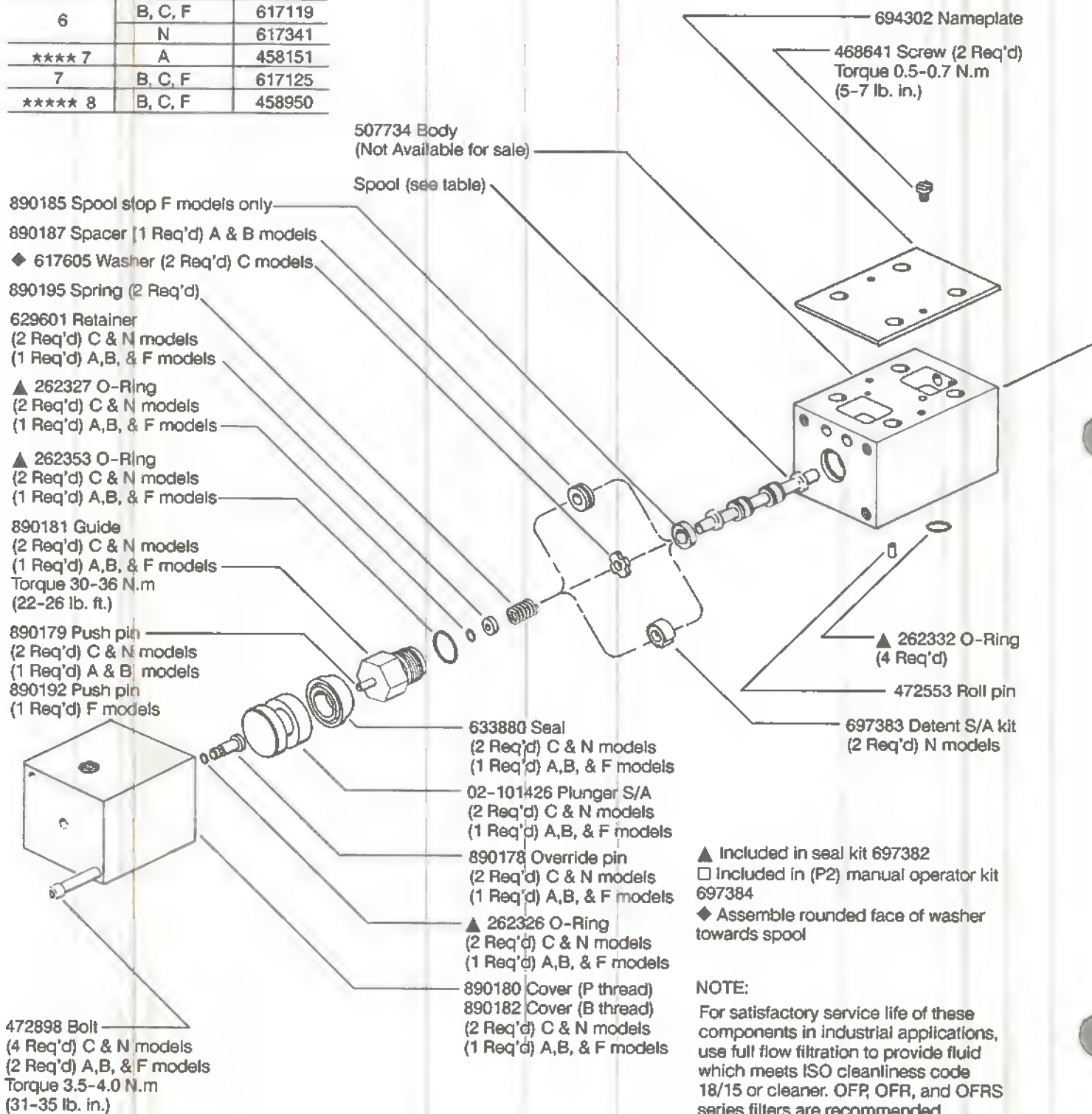
* Assemble type "OA", "2A", and "6A" spool in body with longer end land opposite of operator.

** Assemble type "1" spool in body with narrow center land towards "A" port. Assemble type "11" spool in body with narrow center land towards "B" port.

*** Assemble type "3" spool in body with narrow center land towards "A" port. Assemble type "31" spool in body with narrow center land towards "B" port.

**** Assemble type "7A" and "22A" spool in body with reduced longer end Dia. towards operator.

***** "V" Option, operator "A" is at port "A" end of valve and/or operator "B" is at port "B" end of valve, independent of spool type. Type 8 spool valves will always have a "V" present in model code.



507724 End cap
Torque 30-36 N.m
(22-26 lb. ft.)

▲ 262353 O-Ring

890195 Spring (Ref.)

◆ 617605 Washer

DG18V-3-*A-60 Refer to opposite end
for balance of part numbers.

507724 End cap
Torque 30-36 N.m
(22-26 lb. ft.)

▲ 262353 O-Ring

890195 Spring (Ref.)

◆ 617605 Washer

DG18V-3-*B-60 Refer to opposite end
for balance of part numbers.

DG18V-3-*C-60 Refer to opposite end
for part numbers

507724 End cap
Torque 30-36 N.m
(22-26 lb. ft.)

▲ 262353 O-Ring

890195 Spring (Ref.)

◆ 617605 Washer

890186 Spacer

DG18V-3-*F-60 Refer to opposite end for
balance of part numbers.

DG18V-3-*N-60 Refer to "C" layout for
part numbers

VALVE ASSEMBLY NOTE:

Right hand assembly shown for all single
operator models.

For left hand assembly, DG18V3-*A-(P2),
all parts are reversed except body.

For left hand assembly, DG18V3-*B-(P2)
and DG18V3-*F-(P2), all parts are
reversed except body and spool.

Model Code

D G 18 V -3- * * (L) - (P2) - (V) -* - 60



1 Directional control valve, subplate mounted

2 Air pilot operated

3 Rated pressure

350 bar (5000 psi)

4 Interface

ISO 4401-03 (CETOP 3, NFPA D03)

5 Spool type (Center condition)

- 0 - Open center (All ports)
- 1 - Open center (P & A to T)
- 2 - Closed center (All ports)
- 3 - Closed center (P & B)
- 6 - Closed center (P only)
- 7 - Open center (T blocked)
- 8 - Tandem center (P to T)
- 11 - Open center (P & B to T)
- 22 - Closed center (Two-way)
- 31 - Closed center (P & A)
- 33 - Closed center (Bleed A & B)

6 Spool spring arrangement

- A - Spring offset to CLY. A, (Single operator)
- B - Spring centered, (Single operator)
- C - Spring centered (Dual operator)
- F - Spring offset, to CLY. A, shift to center (Single operator)
- N - No-spring, detented

7 Build type

- L - Left hand build (Single operator only)
- Blank - Standard right hand build (Single operator only)

8 Manual override option

- P2 - Manual operator in end cap, (single operators) (Applicable for A(L), B(L) & F(L) models only)
- Blank - Overrides in operator end only

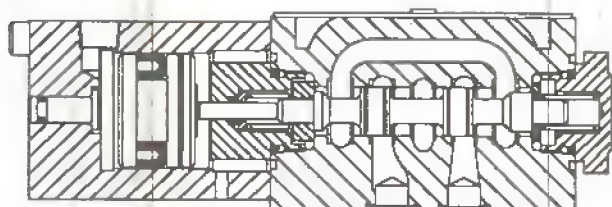
9 Actuator identity

V - Actuator identifier included for all type 8 spools (Refer to spool assembly note *****)

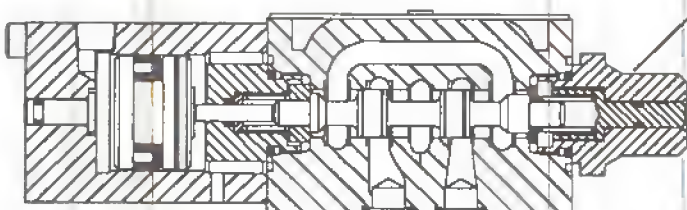
10 Thread connection type

- P - 1/8" NPT threads
- B - 1/8 BSP threads

11 Design number

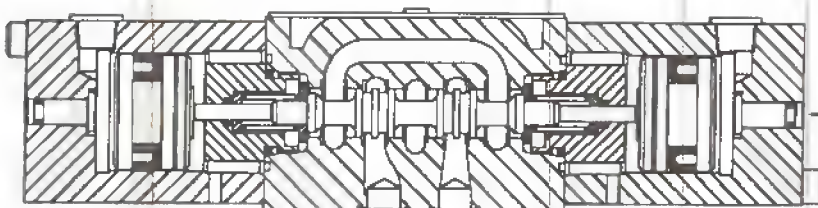


DG18V-3-*A-*-60 Typical spring offset valve / single operator



□ 507971 Plug & pin S/A
Torque 30-36 N.m (22-26 lb. ft.)

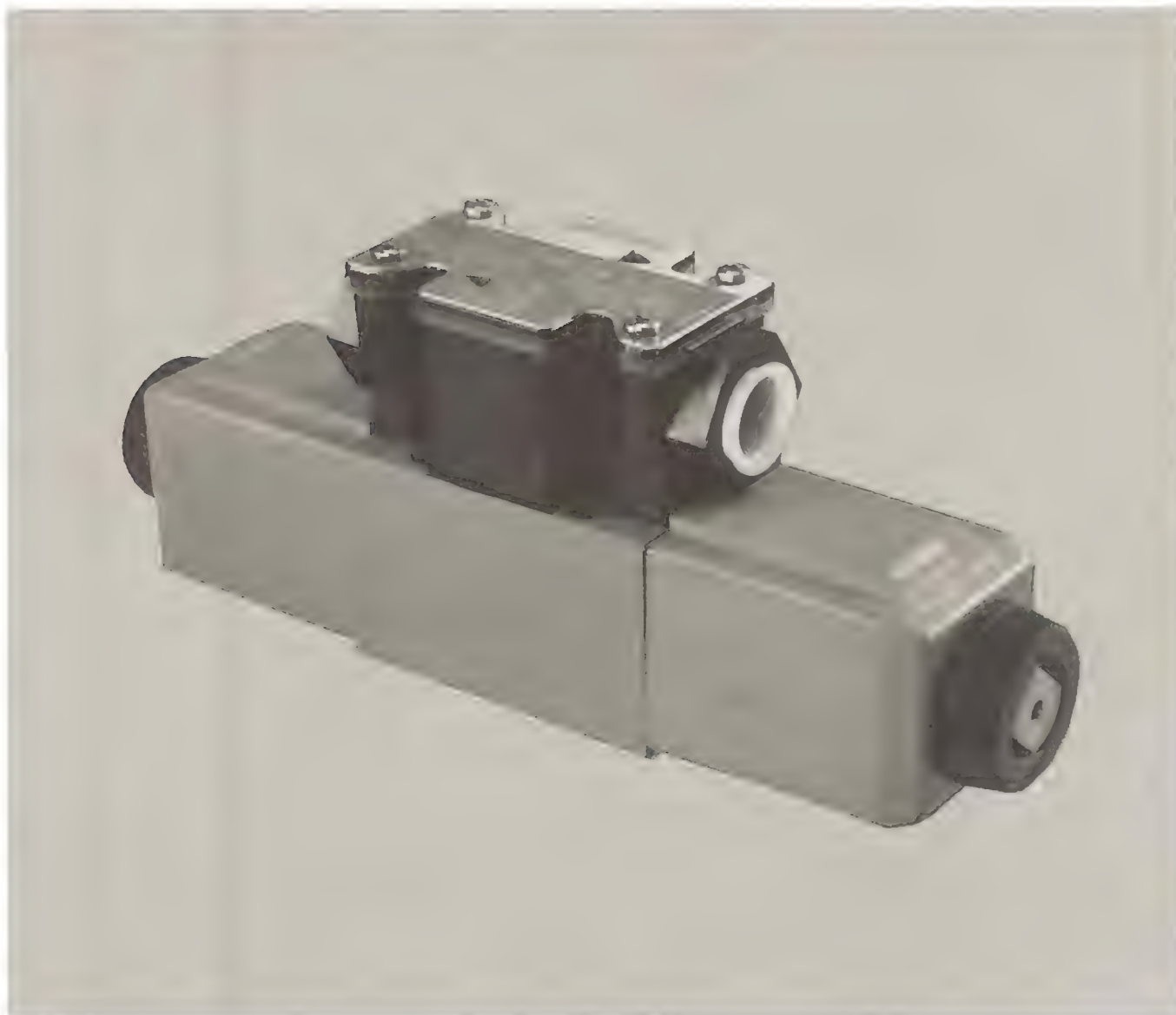
DG18V-3-**-P2-*-60 With manual operator in end cap / single operator



DG18V-3-*C-*-60 Typical spring centered valve / dual operator

Cetop 3 Size Proportional Directional Control Valves

KD/TG4V-3S-*B/C/F(L)-**-*-(V)M-***(I)-*5-60-(EN**)

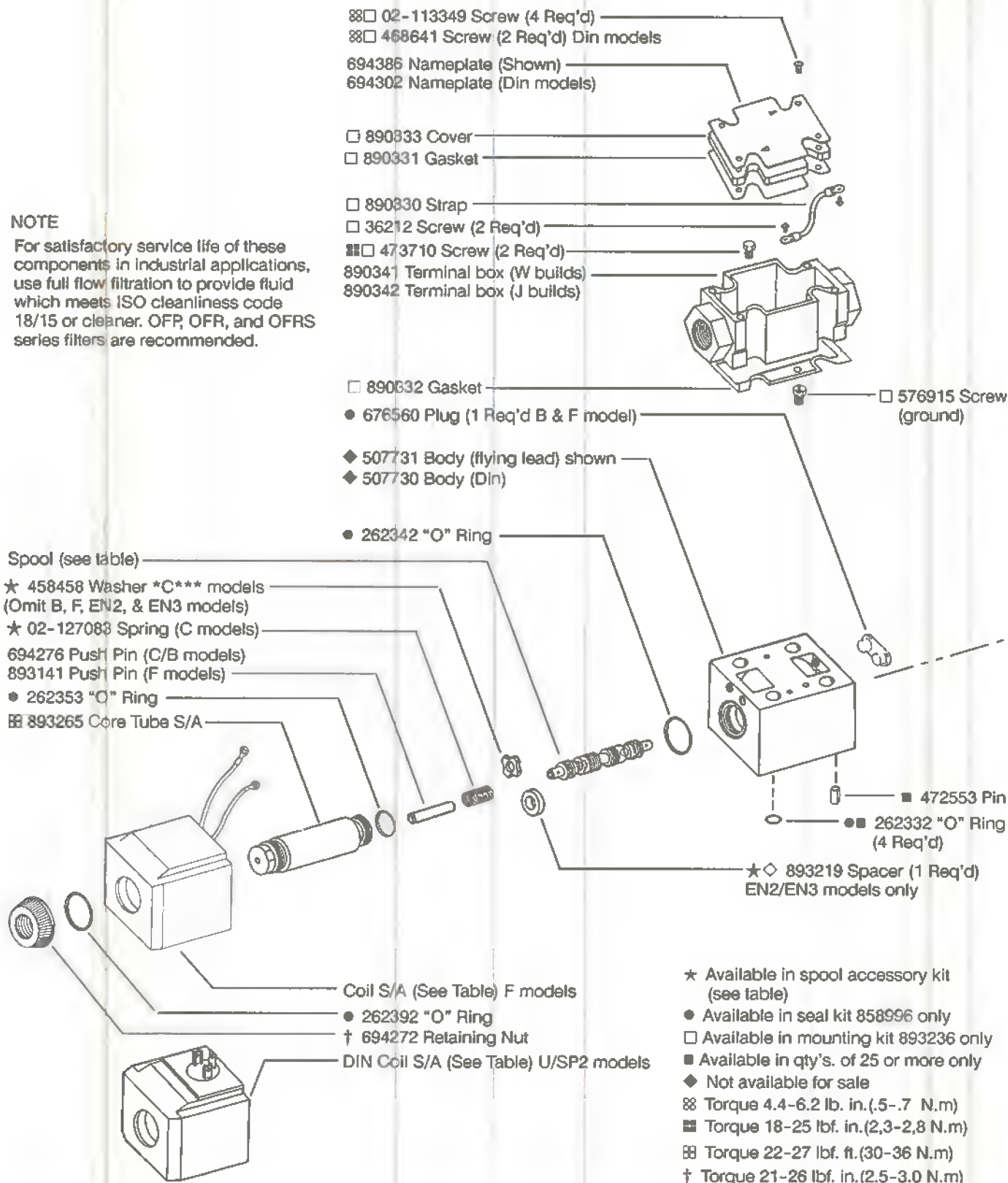


Vickers Incorporated
A TRINOVA Company
5445 Corporate Drive
P. O. Box 302
Troy, Michigan 48007-0302
U.S.A.

COIL- LETTER	COIL S/A F MODELS	COIL S/A U MODELS	COIL S/A SP2 MODELS
G	02-134567	02-134569	
GP	508172	507847	02-111166
H	02-134568	02-134570	
HA	508173	507848	02-111168

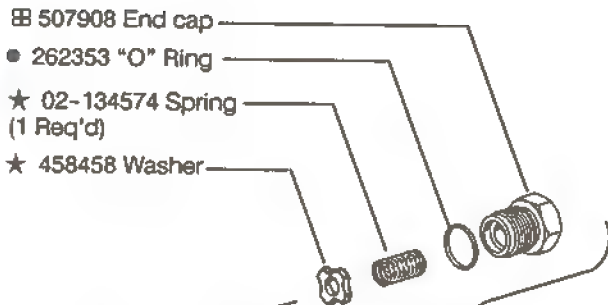
NOTE

For satisfactory service life of these components in industrial applications, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. OFP, OFR, and OFRS series filters are recommended.



NOTE

See service drawing I-3886-S for options not shown.

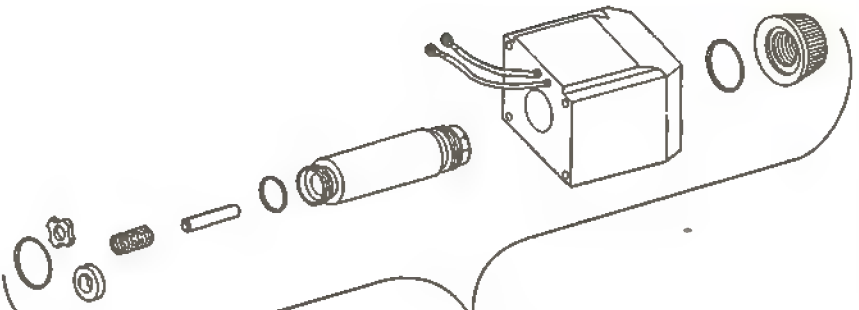


NOTE

KTG4V-3S-*B(L)-(V)M-FW-60**
Spring Centered, Sol. "A" Removed
Refer to other end of valve for common part numbers except as noted.

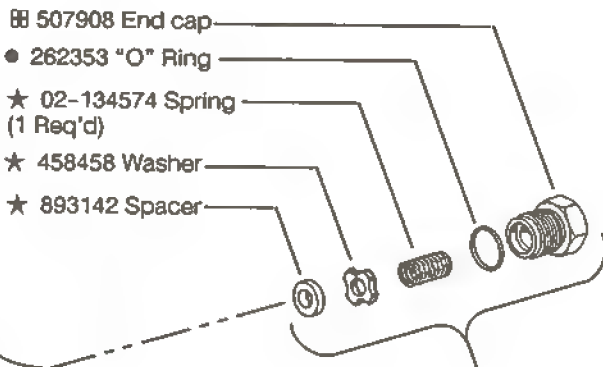
NOTE

Right hand assembly shown for all single solenoid valves, for left hand assembly all parts are reversed except body.



NOTE

KDG4V-3S-*C*N-(V)M-FW-60-(EN2/3)
KDG4V-3S-*C-(V)M-FW-60-(EN4)**
Spring Centered, Dual Solenoid
Refer to other end of valve for common part numbers except as noted.



NOTE

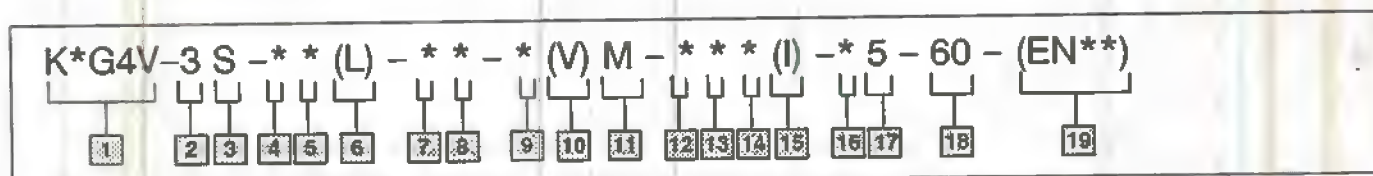
KTG4V-3S-*F(L)-(V)M-FW-60**
Spring offset to CYL. "A", shift to center
Refer to other end of valve for common part numbers except as noted.

SPOOL NOTES

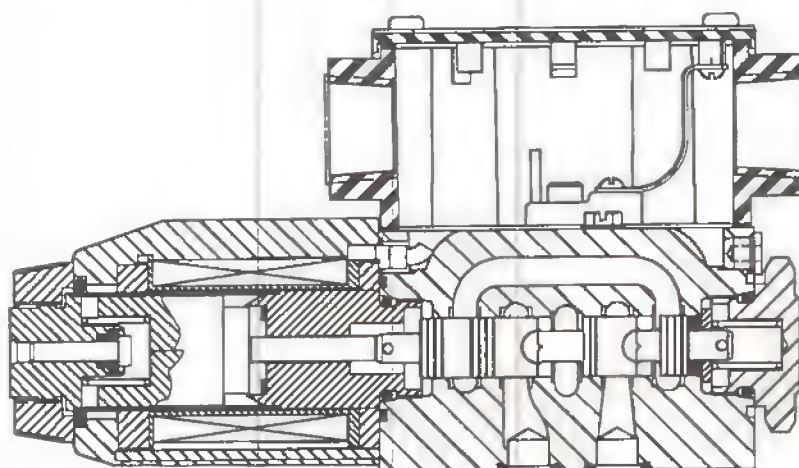
☆ Assemble type 2C15S-EN4 spool with long land over "A" port.
◇ Assemble spacer 893219 on "A" port end for 3C15N-EN2 spool and on "B" port end for 131C15N-EN3 spool.
Assemble spool with notched land over "A" port for both EN2 and EN3 models.
♣ Assemble spool with long land over "B" port.
⌘ Assemble spool with long land over "A" port.

MODEL	SPOOL	TYPE	SPOOL ACCESSORY KIT
-*C***	893131	2C19S	697373
	893132	2C19N	
	893127	2C08S	
	893128	2C08N	
	893129	2C15S	
	893130	2C15N	
	893138	33C08A	
	893139	33C15A	
	893220	33C22A	
	893134	☆ 2C15S-EN4	
-*B**N	893133	◇ 3C15N-EN2	697376
	893133	◇ 131C15N-EN3	
	893137	♣ 2*19N	
-*F**N	893136	♣ 2*08N	697375
	893221	♣ 2*15N	
	893137	⌘ 2*19N	
	893136	⌘ 2*08N	
	893221	⌘ 2*15N	

Model Code



- | | | |
|--|--|--|
| <p>1 K - Proportional
D - Directional control valve
T - Throttle valve
G - Subplate mounted
4 - Solenoid operated
V - 350 Bar (5075 psi) P, A, & B ports</p> <p>2 Interface
3 - ISO-4401-03 CETOP 3 (NFPA D03)</p> <p>3 Standard performance
S - Standard performance</p> <p>4 Spool type (see table)</p> <p>5 Spool/Spring arrangement
B - Spring centered, sol. A removed
C - Spring centered, dual solenoid
F - Spring offset to cyl. A, shift to center</p> <p>6 Build type
L - Left hand build single solenoid models only
Blank - Standard right hand build</p> <p>7 Spool flow rating (@ 10 bar (145 psi) pressure drop)
08 - 8 L/min. (2 USgpm)
15 - 15 L/min. (4 USgpm)
19 - 19 L/min. (5 USgpm)</p> | <p>8 Metering condition
S - Meter-out (only)
A - Meter-in (only)
N - Meter-in and Meter-out</p> <p>9 Manual override options
Blank - Plain override solenoid ends only
H - Waterproof override solenoid end only
P2 - Plain override both ends of single solenoid models</p> <p>10 Solenoid Identification (models with EN2, EN3 or EN4 require V in model code for reverse solenoid identification)</p> <p>11 Flag
Electrical options & features (refer to service drawing I-3886-S)</p> <p>12 Coil type
F - Flying lead
U - DIN 43650
SP1 - Single 6.3 mm series spade to IEC 760 (Direct D.C. models only)
SP2 - Dual 6.3 mm series spade to IEC 760 (Direct D.C. models only)</p> | <p>13 Electrical connections (F type coil only) omit if not required
T - Wired terminal block
PA - Instaplug male receptacle only
PB - Instaplug male & female receptacle
PA3 - Three pin connector
PA5 - Five pin connector</p> <p>14 Housing (F type coils only)
W - 1/2 NPT thread wiring housing
J - 20 mm thread wiring housing</p> <p>15 Electrical Options (omit when not required)
I - ISO 4400 with fitted plug (U models only)</p> <p>16 Coil identification letter (see table)</p> <p>17 Tank pressure rating
5 - 100 Bar (1450 psi)</p> <p>18 Design</p> <p>19 Special modifications (omit if not required)</p> |
|--|--|--|



Typical sectional view, KTG4V-3S-*F(L)**-(V)M-FW-*5-60 spring offset valve.

Directional Valve with Spool Position Indicator Switch

DG4V-3 - - - S6, 60 Series

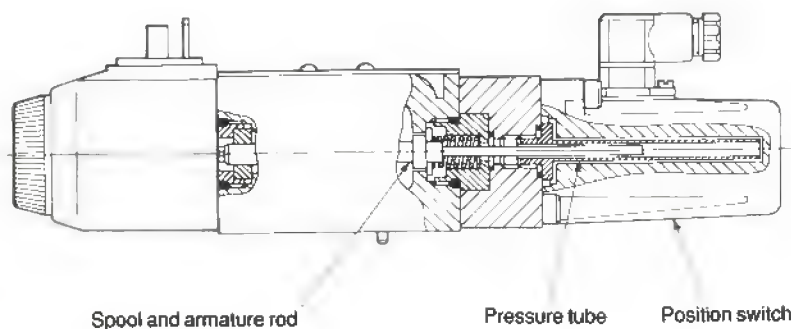


1. General Description

A single-solenoid-operated directional valve with an integral electrical switch that indicates when the valve spool is in the spring-retained position. This model is ideally suited for use in systems where electrical indication of a known condition of the valve is required for interlocks, system sequencing, etc.

The basic valve is a Vickers DG4V-3, 60 series, featured in catalog C-2015A.

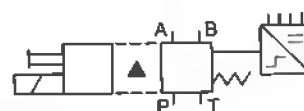
Sectional Illustration



2. Functional Symbols

Single solenoid valves, solenoid at port A end

DG4V-3-*A valves

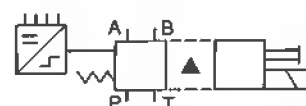


Spool symbols



Single solenoid valves, solenoid at port B end

DG4V-3-*AL valves



Spool symbols



▲ Transient condition only
◆ Spring offset, valve flow path(s) at switching point

Note: spool type shown in bold is featured in the "Preferred Model Selection" below.

3. Model Code

The model code structure is as shown in catalog C-2015A, to which item numbers refer.

DG4V-3 - -A(L)-(**)-(V)M-S6-U - * * -60-(EN***)-(P**-A**-B**-T**)**

1	2	3	4	5	6	7	9	10	11	12	13
---	---	---	---	---	---	---	---	----	----	----	----

Features/options listed here are those available with the "-S6-" model.

Features shown in bold are found in the "Preferred Model Selection" below.

1 Performance specification

3 only

2 Spool type

0 or 2 or 22 only

3 Spool spring arrangement

L = LH build

Omit for RH build

4 Manual override option

No symbol: standard manual override only

5 Solenoid energization identity

See catalog C-2015A

6 Spool indicator switch S6

See this catalog (for AC switch models, types S3, S4 and S5, see catalog C-2015A)

7 Solenoid type/connection

U only (ISO 4400)

9 Coil rating

Full power coils:

A = 110V AC 50 Hz

B = 110V AC 50 Hz/115V AC

60 Hz ▲

C = 220V AC 50 Hz/240V AC

60 Hz ▲

G = 12V DC

H = 24V DC

▲ For use with 60 Hz or dual frequency applications

10 Port T rating

For AC coils:

6 = 160 bar (2300 psi)

For DC coils:

7 = 210 bar (3045 psi)

11 Design number, 60 series

See catalog C-2015A

12 Special features

See catalog C-2015A

13 Port restrictor plugs

See catalog C-2015A

Preferred Model Selection

The models listed here are in regular volume production and are therefore most readily available at competitive prices. Other models constructed from the model code may be made available subject to the quantity requested. Please check availability and price before ordering.

DG4V-3-2A-M-S6-U-B6-60

DG4V-3-2A-M-S6-U-H7-60

4. Operating Data

For characteristics not listed here, refer to "Operating Data" in section 4 of catalog C-2015A under heading "High performance valve DG4V-3".

Pressure limits: P, A and B ports T port:	350 bar (5075 psi)
AC solenoid models	160 bar (2300 psi)
DC solenoid models	210 bar (3045 psi)
Mounting interface	ISO 4400, size 03 ANSI/B93.7M, size D03 NFPA-D03 CETOP RP65H, size 3 DIN 24340, NG6

Continued on next page

Input:	
Supply voltage	10 to 35V DC inclusive of a max. 4V pk-to-pk ripple
Current, switch open	5 mA
Current, switch closed	255 mA
Outputs:	
Max. continuous current	250 mA
Voltage	2V below input at max. load
Load impedance	From 32Ω at 10V supply to 132Ω at 35V supply
Max. switching frequency	10 Hz
Plug connections:	
Pin 1 (output 1)	Normally open
Pin 2	Supply +ve
Pin 3	0V
Pin 4 (output 2)	Normally closed
Switching point	Within the spool spring off-set condition◆
Connector	Pg7 (supplied with valve)
Protection:	Overload and short-circuit protected; self re-setting. IEC 144 class IP65 with connector correctly fitted.

◆ Factory setting ensures this condition under all combinations of manufacturing tolerance and of temperature drift (see "Temperature Limits").

Temperature Limits

Minimum ambient -20°C (-4°F)

Maximum ambient

Valves with coils listed in model code position [9] and at stated percentages of rated voltage.

Coil type and frequency	Percentage voltage	Max. ambient temperature
Dual frequency coils		
at 50 Hz	107%	40°C (104°F)
at 50 HZ	110%	30°C (86°F)
at 60 Hz	107%	50°C (122°F)
at 60 Hz	110%	40°C (104°F)
Single frequency (50 Hz) coils		
at 50 Hz	110%	40°C (104°F)
DC coils	110%	70°C (158°F)

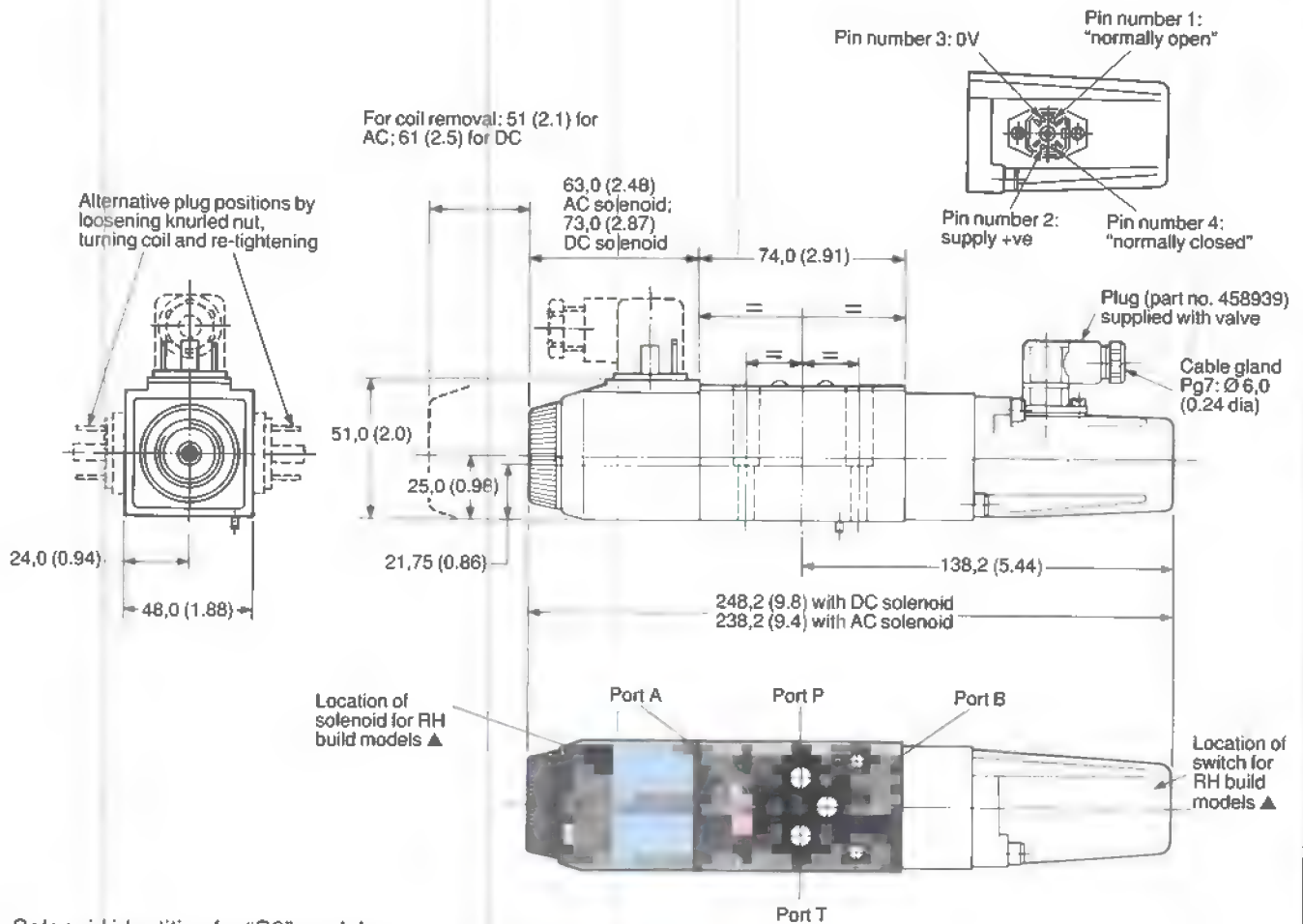
Further Information

For details of filtration, hydraulic fluids and fluid temperatures, see section 4 of catalog C-2015A.

5. Performance Data

See section 5 of catalog C-2015A under heading "DG4V-3 (High Performance) Models".

6. Installation Dimensions in mm (inches)



Solenoid identities for “\$6” models

Model (Refer to 3 & 5 in model code)	Spool types	Solenoid identity
DG4V-3-**-A-M-S6-U**-6*	0, 2 or 22	B
DG4V-3-**-A-VM-S6-U**-6*	0, 2 or 22	A
DG4V-3-**-AL-M-S6-U**-6*	0, 2 or 22	A
DG4V-3-**-AL-VM-S6-U**-6*	0, 2 or 22	B

▲ For LH models ("L" in model code location **3**) solenoid and switch locations are reversed

7. Mass

2,2 kg (4.8 lb)

8. Electrical Plugs and Connectors

See "Plugs for ISO 4400 (DIN 43650) type coil connectors", section 8 of catalog C-2015A.

9. Installation Data

See section 9 of catalog C-2015A.

Presented by:

10. Spare Parts Data

See section 10 of catalog C-2015A.

VICKERS
A TRIVIOVA Company

Proportional Slip-in Type Cartridge Throttles to DIN 24342

CVU-**-EFP1-31 design and
Electronic Amplifier EEA-PAM-571-A-12 design



1. Basic Characteristics

Valves

Nominal sizes.....NG16; NG25; NG40
Max. operating pressure315 bar
(4567 psi)
Flow ratings up to900 l/min
(238 USgpm)
Hysteresis.....<1%
Repeatability.....±0.5%

Amplifier

Power input 20-30V DC
(24V DC nominal)

2. General Description

Proportional throttle (restrictor) valves for use where one or more of the following requirements exist.

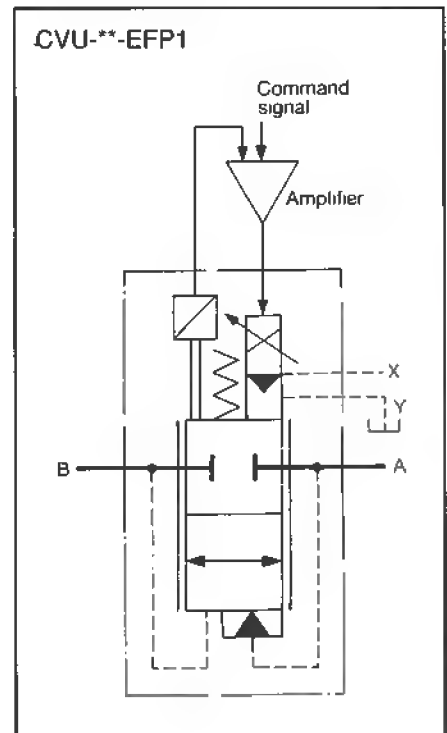
- Remote control of machine actuator speed, linear or rotary.
- Speed control in accordance with machine operating cycles or programs.
- Meter-in, meter-out or bleed-off application of the throttle valve itself.
- Pressure compensated flow control with the aid of a pressure hydrostat module, in any of the same three application modes.
- Smooth control of machine acceleration and/or deceleration.
- For industrial and mobile applications.

Note: Correct performance of valves can only be obtained using Vickers amplifier EEA-PAM-571-A-12.

3. Features and Benefits

- New 2-stage NG16 size with increased flow rating.
- Valves suitable for uni-directional and bi-directional control of flow.
- 3 valve sizes offer choice of flow capacities
NG16: 190 l/min (50 USgpm)
NG25: 450 l/min (119 USgpm)
NG40: 900 l/min (238 USgpm)
at 10 bar (145 psi) Δp .
- Designed for zero leakage when closed.
- Common amplifier for any valve size minimises inventory.
- 24V DC nominal supply to amplifier to suit state-of-art control systems.
- Choice of command signals.
- Acceleration and deceleration requirements can be adjusted on-site by "ramp" potentiometer.
- Facility for on-site adjustment of "dead band" compensation and "gain".
- Setting-up and fault diagnosis eased by panel display and signal monitoring points.

4. Functional Symbol



5. Model Codes (Valves)

F3-CVU--EFP1-B29-**-31**

- | | | | |
|---|---|---|---|
| 1 | 2 | 3 | 4 |
| <p>1 Special seals for phosphate ester fluids
Omit for standard seals; see "Hydraulic fluids" section.</p> | | | |
| <p>2 Nominal size (NG)
Flow path diameter mm
16
25
40</p> | | | |

- | | |
|---|--|
| 3 | <p>Rated flow at 10 bar (145 psi) Δp
19 = 190 l/min (50 USgpm), size 16 only
45 = 450 l/min (119 USgpm), size 25 only
90 = 900 l/min (238 USgpm), size 45 only</p> |
| 4 | <p>Design number
Subject to change: Installation dimensions unaltered for design numbers 31 to 39 inclusive.</p> |

6. Operating and Performance Data (Valves)

Performance data is typical with fluid at 25 cSt (119 SUS) and 50°C (122°F)

Pressure ratings: Ports A, B, X Port Y	315 bar (4567 psi) max. ≤2 bar (29 psi)		
Cracking pressure: For flow A to B For flow B to A (see diagram 1.4 for valve area ratios)	2,5 bar (36 psi) 6,5 bar (94 psi)		
Flow ratings A to B/B to A	See 5. Model codes [3]		
Spool overlap, dead-band, typical			
CVU-16	30% of full stroke		
CVU-25	23% of full stroke		
CVU-40	20% of full stroke		
Peak solenoid current at 50°C (122°F) ambient			
Nominal	2.2A (13.6W)		
Max.	2.9A (18W)		
Solenoid coil resistance at 20°C (68°F)	2.8Ω		
Relative duty factor	Continuous rating (ED = 100%)		
Electrical protection with plugs fitted	IEC 144 class IP 65		
Dynamic performance‡	CVU-16	CVU-25	CVU-40
• Step input response at Δp 50 bar (725 psi): valve stroke between zero overlap and fully open. Opening time Closing time	40 ms 50 ms	60 ms 60 ms	125 ms 125 ms
• Frequency response ▲, zero flow; 100 bar (1450 psi) at ports A, B, X. -3dB amplitude ratio 90° phase lag	26 Hz 23 Hz	18 Hz 17 Hz	18 Hz 17 Hz
• Hysteresis	<1%	<1%	<1%
• Repeatability	±0.5%	±0.5%	±0.5%
Mass	3,3 kg (7.3 lbs)	4,1 kg (9.0 lbs)	8,0 kg (17.7 lbs)

‡ using amplifier EEA-PAM-571-A-12

▲ sinusoidal input ±5% at 50% full stroke command signal

Hydraulic Fluids

All cartridge valves can be used with anti-wear hydraulic oils, and certain low viscosity fluids. Add prefix "F3" to model designations when phosphate ester (not alkyl-based) or chlorinated hydrocarbons are to be used. The extreme viscosity range is from 500 to 5 cSt but the recommended running range is from 54 to 13 cSt. For further information about fluids, see "Technical information" leaflet B-920.

Temperature limits

Ambient min. -20°C
Ambient max. +70°C

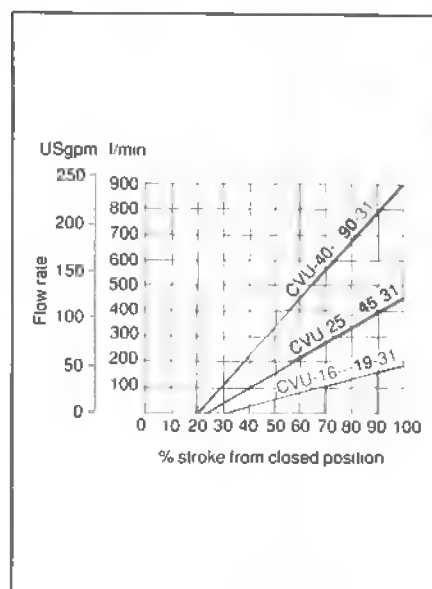
Fluid temperatures

	Mineral oil	Water-containing
Min.	-20°C	+10°C
Max.	+80°C	+54°C

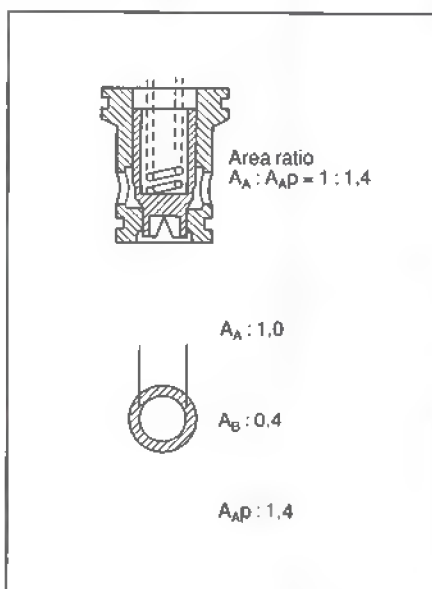
Filtration requirements

ISO 4406: 1986 class 16/13 or better.

Flow/stroke characteristics

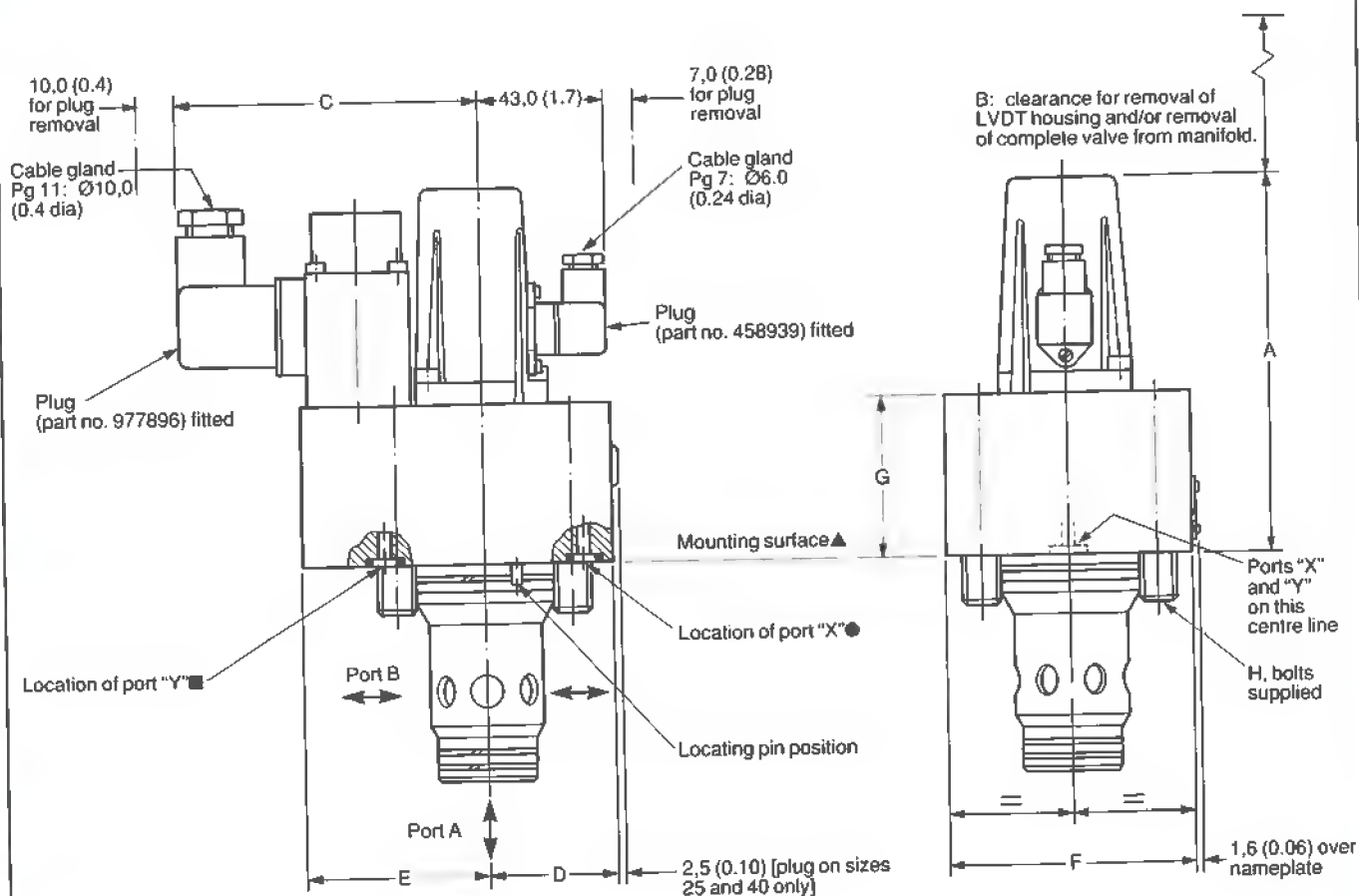


Valve area ratios



7. Installation Dimensions for Valves in mm (inches)

3rd angle
projection

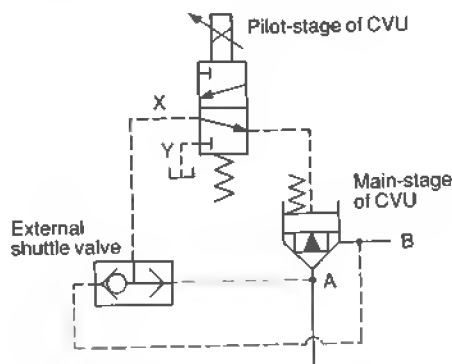


Dimension	CVU-16	CVU-25	CVU-40
A	130,00 (5.12)	128,00 (5.04)	133,00 (5.24)
B	68,50 (2.70)	71,50 (2.82)	104,00 (4.10)
C	109,50 (4.31)	105,50 (4.15)	105,50 (4.15)
D	32,50 (1.28)	42,50 (1.67)	63,00 (2.48)
E	70,00 (2.76)	65,50 (2.58)	63,00 (2.48)
F	66,60 (2.62)	85,00 (3.45)	126,00 (4.96)
G	57,00 (2.24)	55,00 (2.16)	60,00 (2.36)
H	4 x M8 x 35	4 x M12 x 45	4 x M20 x 70

Connections to port X

For **unidirectional** control of flow (ie A to B or B to A) port X must be connected to upstream port pressure.

For **bidirectional** control of flow (ie flow A to B and B to A at different times during an operating cycle) port X must be connected to **both** A and B via a shuttle valve (see diagram).

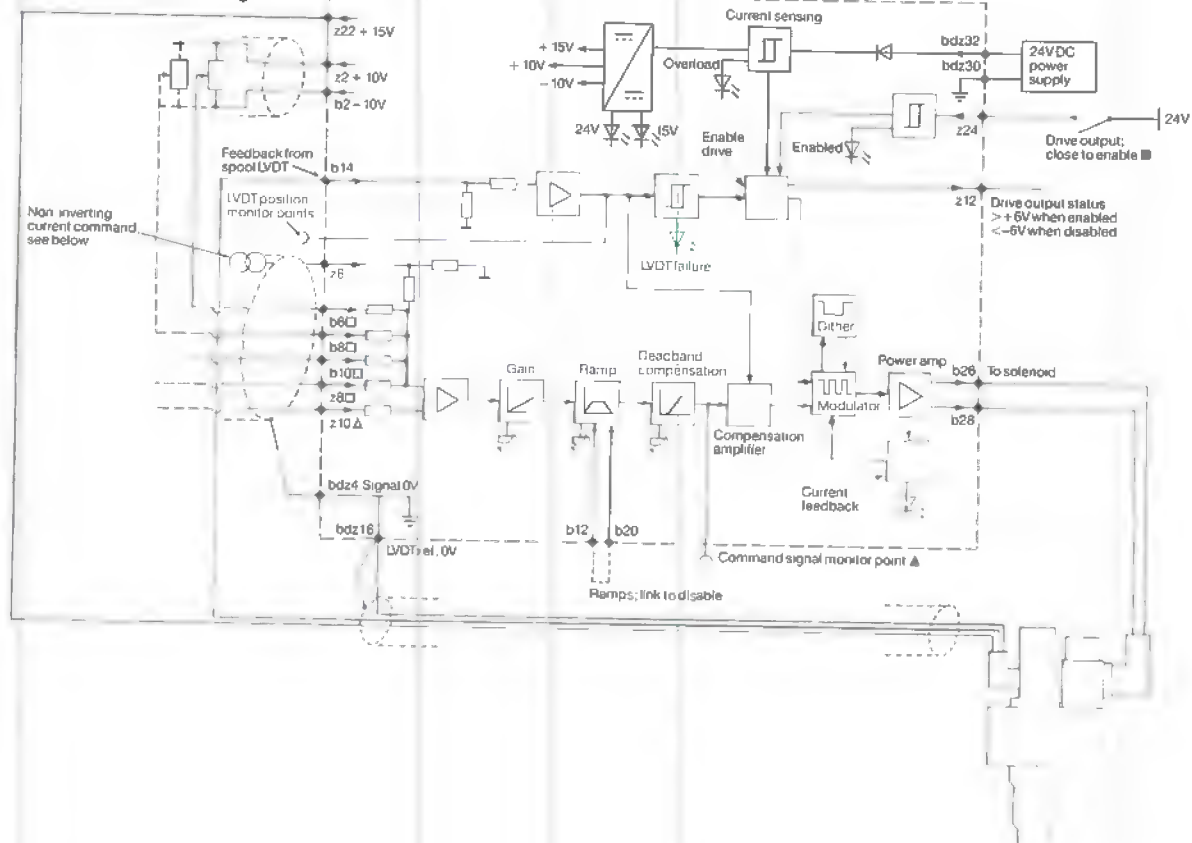


- ▲ Installation dimensions below mounting surface, including location of ports "X" and "Y" and size/length of bolts "H", conform to requirements of DIN 24342 (see Vickers data sheet B-995).
- Connect to drain: pressure must not exceed 2 bar (29 psi).

8. Power Amplifier Circuit and Connections

EEA-PAM-571-A-12 design

Typical signal arrangement



Command signals and outputs

Command signals

Type	Ref.	Input pins Signal polarity	Secondary pins ref.
Non-inverting voltages	b6/8/10 or z8	+	bdz4
Non-inverting current	z6	+	
Inverting voltage	z10	-	Link one of b6/8/10 or z8 to bdz4
Differential voltage		-	One of b6/8/10 or z8
	One of b6/8/10 or z8	+	z10

LVDT connections

LVDT plug pin	Amplifier pin
1	b14
2	z22
3	bdz16
4	-

- ▲ On front panel
- 10 to 30V to enable, ≤0.8V or open circuit to disable
- Non-inverting voltage commands
- △ Inverting or differential voltage command

9. Operating Data (Amplifier)

Power (input) supply	20 to 30V DC x 40W max. 24V DC nominal 2V pk-to-pk max. ripple
Control (output) supplies: z22 z2 b2	+15V x 50 mA max. in addition to LVDT demand +10V x 5 mA max. -10V x 5 mA max.
Command signal inputs: Direct voltage pins Inverting voltage pin Current pin Voltage range Input impedance (voltage) Current range Input impedance (current)	b8, b6, z8, b10 z10 z6 10V 47 k Ω 20 mA 100 Ω
Standing solenoid current at zero command signal	1,1A
Deadband compensation: Factory-setting Adjustment	10% of max. stroke▲ 0 to 50% of max. stroke▲
Gain control: Factory-setting Adjustment per direction from centered position	Max. spool stroke at 10V command signal▲ 1,9 to 20% of max. spool stroke per V▲
Ramp time adjustment, linear: Factory-setting Adjustment	Max. time 50 ms to 2s, under pre-set deadband compensation and gain conditions
Dither	Factory-set
Feedback from LVDT to b14	12 to 20 mA (100 Ω)
Overload protection, factory-set	Automatic reset when fault removed
Output enabled (power available to solenoid)	Apply 10 to 30V to z24 (6,8 k Ω)
Output disabled (no power output to solenoid)	Apply $\leq 0,8V$ or open circuit to z24
Ramp enabled (machine actuator acceleration and deceleration limited by ramp potentiometer)	Open circuit between b20 and b12
Ramp disabled (fastest acceleration and deceleration of machine actuator; ramp circuit bypassed)	Link b20 to b12
Command signal monitor point	5V full scale. Command signal conditioned by deadband compensation, gain and ramp functions
Spool position monitor point	5V full scale
Monitor point impedance	10 k Ω
Monitor point protection	Short-circuit protected
Output point (z12) to alarm indicator	>+6V when enabled <-6V when disabled

Continued on next page

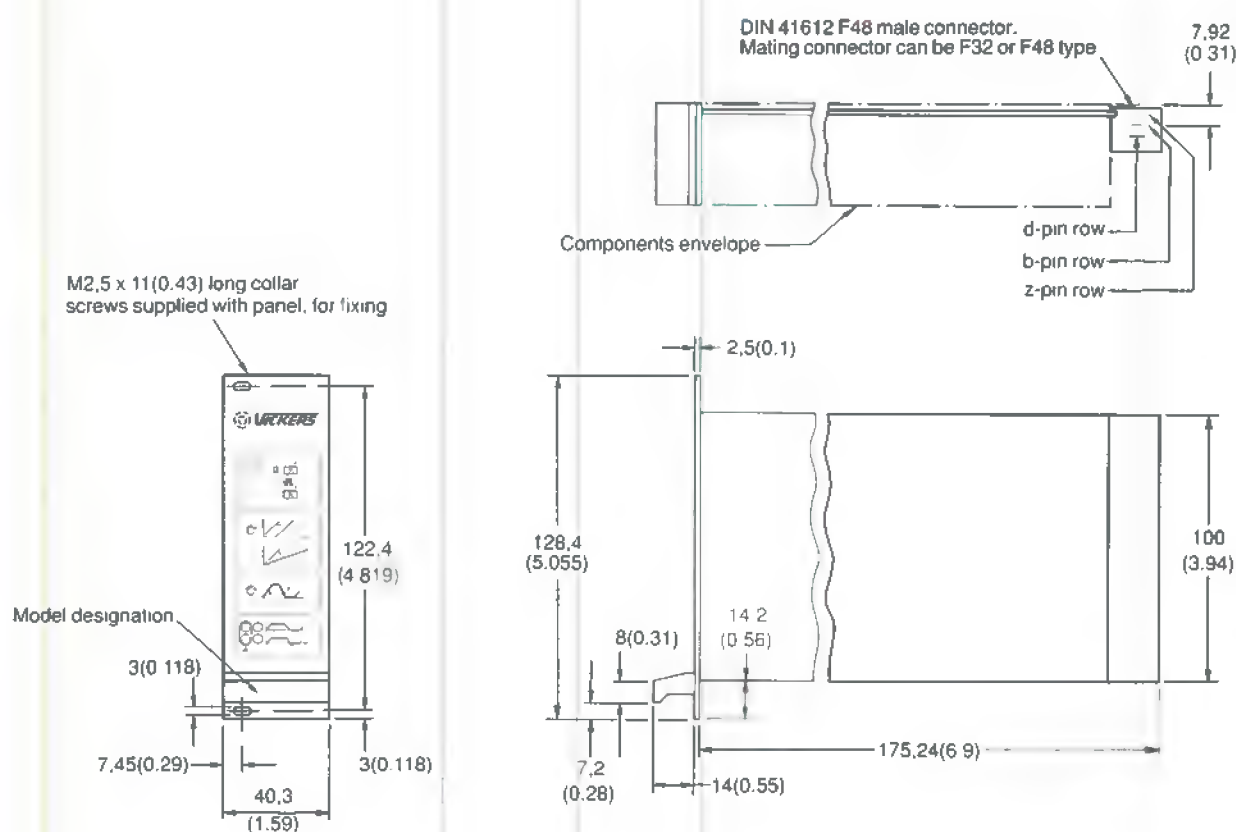
Ambient temperature range	0 to 50°C (32 to 122°F)
Coding pin hole location	Between b and d3
Installation dimensions and front panel display	See below and next page
Mass	0,22 kg (0.48 lb)
Supporting products: Power supply unit options Electronic accessories Portable test equipment	See catalog C-2007 B

▲ From spoil-closed position

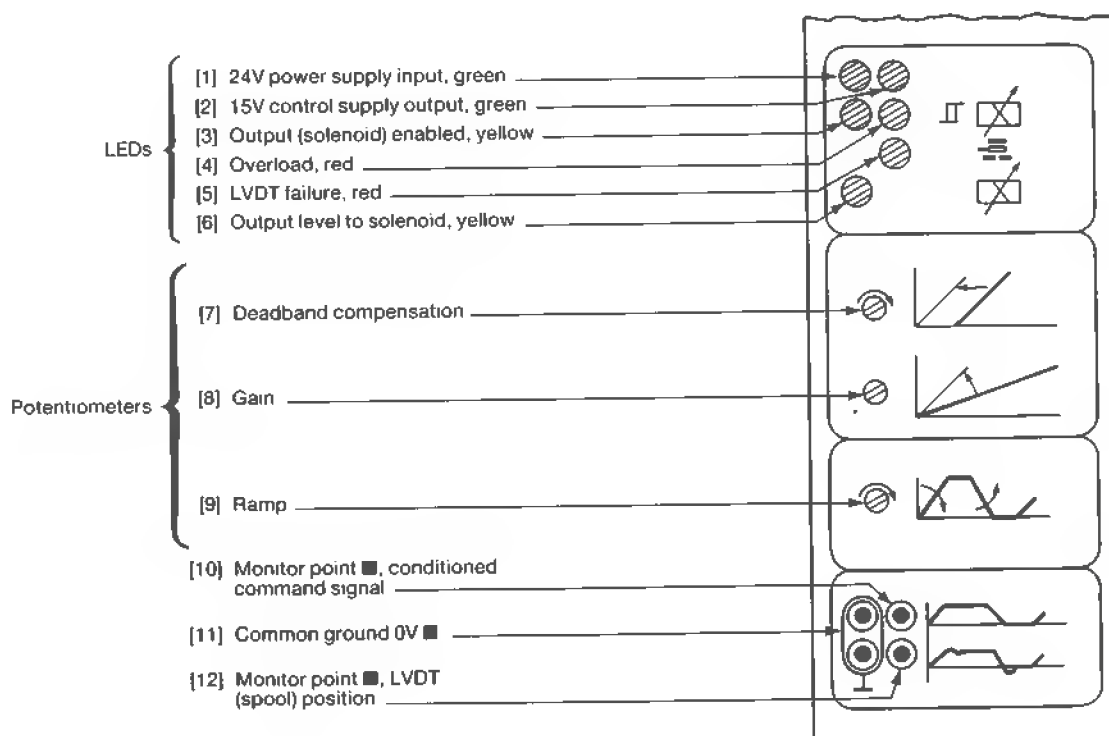
10. Installation Dimensions for Amplifier in mm (inches)

Plug-in unit of 3U height, to IEC 297

3rd angle
projection



Panel display, full size



■ Ø2 (0.0787 dia) sockets

Presented by:



Proportional Pressure Relief Valves

KCG-3, 10 series
KACG-3, 10 series



1. General Description

An electro-hydraulic proportional relief valve, for mounting on ISO 4401 size 03 interface, designed to regulate pressure in a hydraulic system in proportion to an applied electrical input.

These open-loop, single-stage valves can be used for direct control of pressure in low flow systems, or for pilot control of larger pressure controls, and for such applications as pressure-controlled pumps.

Two model variants are available:

KCG-3

The valve in this basic form responds

to a variable power supply to its solenoid; separate Vickers amplifiers, with PWM output stage and output current control, are available for driving this model.

KACG-3

The addition of an integral drive amplifier allows the pressure to be controlled from a 0 to +10V, or 0 to -10V command signal. The amplifier is mounted in a robust metal housing, sealed against ingress from spray and splashing of water and other fluids. Electrical connections are via a standard 7-pin plug.

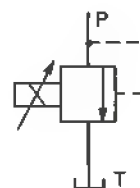
Factory set adjustments ensure high repeatability valve to valve.

2. Features and Benefits

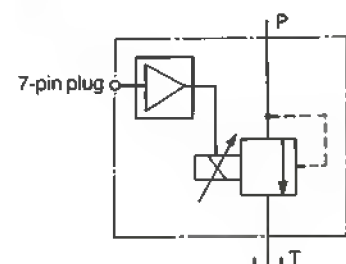
- Valve design ensures low hysteresis and good repeatability.
- Self-bleeding design simplifies installation and ensures consistent performance.
- When used for piloting a large pressure relief or reducing valve, a low minimum pressure is obtainable combined with fast and stable response to step input signals.

3. Functional Symbols

KCG-3



KACG-3



Interim Information

4. Model Code

Features within brackets () are optional; all other features must be specified when ordering.

K(A)CG-3-(L) -* -*** - *1**

1 2 3 4 5

-1* -(EN)**

6 7

1 Integral amplifier

A = valve with integral amplifier
Omit for KCG-3 model.

2 Valve configuration

No symbol = RH build (solenoid at "B" end of body)
L = LH build (solenoid at "A" end of body)

3 Pressure adjustment range

For flow rate of 1 l/min (0.26 USgpm) and fluid viscosity 34 cSt (159 SUS)
40 = 1 to 40 bar (14.5 to 580 psi)
100 = 2 to 100 bar (29 to 1450 psi)
160 = 4 to 160 bar (58 to 2320 psi)
250 = 4 to 250 bar (58 to 3625 psi)
350 = 5 to 350 bar (72.5 to 5075 psi)

4 Type of electrical connection

For KCG models only:

Direct connection to coil
U = ISO 4400 (DIN 43650)
connection (plug not supplied)

Conduit box, molded Nylon 66
(see 7 for aluminium alternative)

FJ = Conduit entry M20 thread

FTJ = With terminal strip; conduit entry M20 thread

FW = Conduit entry 1/2" NPT thread

FTW = With terminal strip; conduit entry 1/2" NPT thread

For KACG models only:

PD7 = 7-pin plug

5 Input voltage to KACG valve or to external amplifier driving KCG valve

G = 12V DC

H = 24V DC

6 Design number, 10 series

Subject to change. Installation dimensions unaltered for design numbers 10 to 19 inclusive.

7 Special features

"EN**" assigned as required.

EN75 = Die-cast aluminium conduit box; optional only when specifying "FJ" or "FW" in position 4.

5. Operating Data

Typical data with fluid at 34 cSt (159 SUS) and 40°C (104°F)

Max. pressures Port P: Operating range Static Port T: Operating Static	See model code 3 350 bar (5075 psi) 2 bar (29 psi) ▲ 210 bar (3045 psi)
Max. flow, both models	3 l/min (0.8 USgpm)
Power supply (see model code 5) For KCG-3: "G" model "H" model For KACG-3: "G" model "H" model	3.5A (1.45Ω) max. at 50°C (122°F) 1.6A (7.3Ω) max. at 50°C (122°F) 12V DC x 3.7A max. (10 to 20V including 10% peak-to-peak max. ripple) 24V DC x 1.8A max. (18 to 36V including 10% peak-to-peak max. ripple)
Command signal, KACG-3 only	0 to +10V DC, or 0 to -10V DC
7-pin plug connector, KACG-3 only: A B C D E F G	Power supply +ve Power 0V Signal 0V +ve voltage command signal -ve voltage command signal Monitor output Protective ground
Gain adjustment, KACG-3 only	Factory set to give max. rated pressure with +10V or -10V command signal. Gain is user-adjustable from 25% to 125% of factory setting. ■
Dither, KACG-3 only	Factory set, not user-adjustable
Monitor point signal, KACG-3	0.5V per amp solenoid current
Power stage PWM, KACG-3	2 kHz nominal
Repeatability, both models	≤ ±0.5%
Linearity, both models: Between 20% and 100% of pressure range	≤ 2.5%
Hysteresis: KCG-3 KACG-3	≤ 3% (with 35 mA RMS dither) ≤ 3% (with factory-set dither)
Valve to valve repeatability: KCG-3 KACG-3	< 10% < 3% at factory settings

Continued on next page

Protection: Electrical, KACG-3 Mechanical, both models Mounting interface	Reverse polarity protected IEC 144, class IP65 ISO 4401, size 03 ANSI/B93.7M, size D03 NFPA, D03 CETOP RP65H, size 3 DIN 24340, NG6
Mass: KCG-3 KACG-3	1,7 kg (3.8 lb) 2,1 kg (4.6 lb)

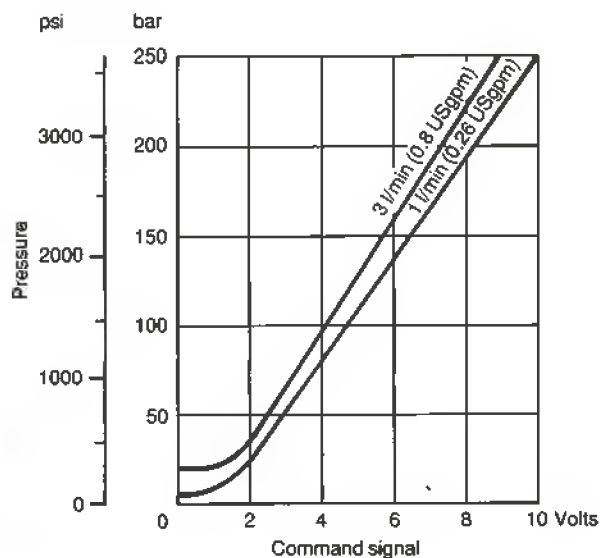
▲ See "9. Installation Data". ■ Altering this factory setting will affect valve to valve interchangeability.

6. Performance Data

Typical data with fluid at 34 cSt (159 SUS)
and 40°C (104°F).

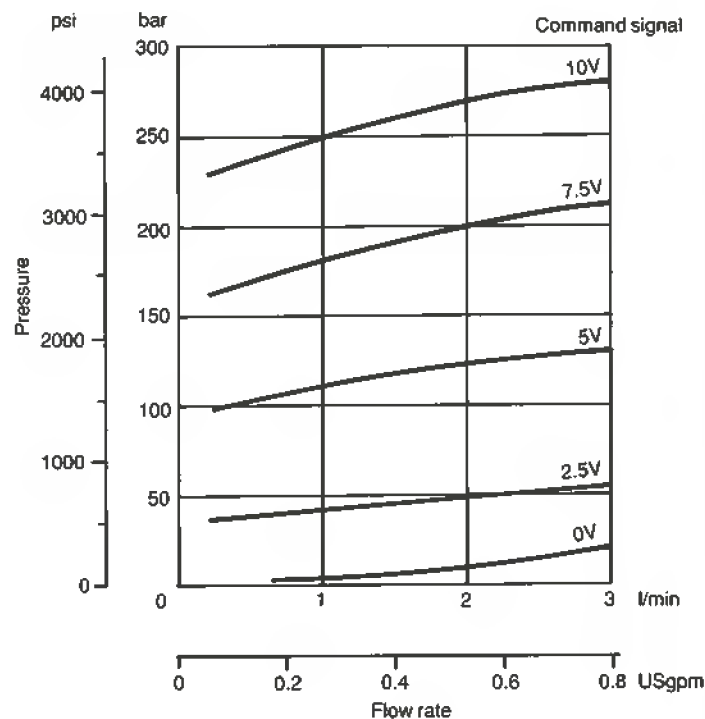
Pressure Gain

Pressure v. command signal for
KACG-3-250-PD7-H1-10



Pressure Override

Data for KACG-3-250-PD7-H1-10



Step Response

KCG and KACG models

0 to 100% step signal at conditions:

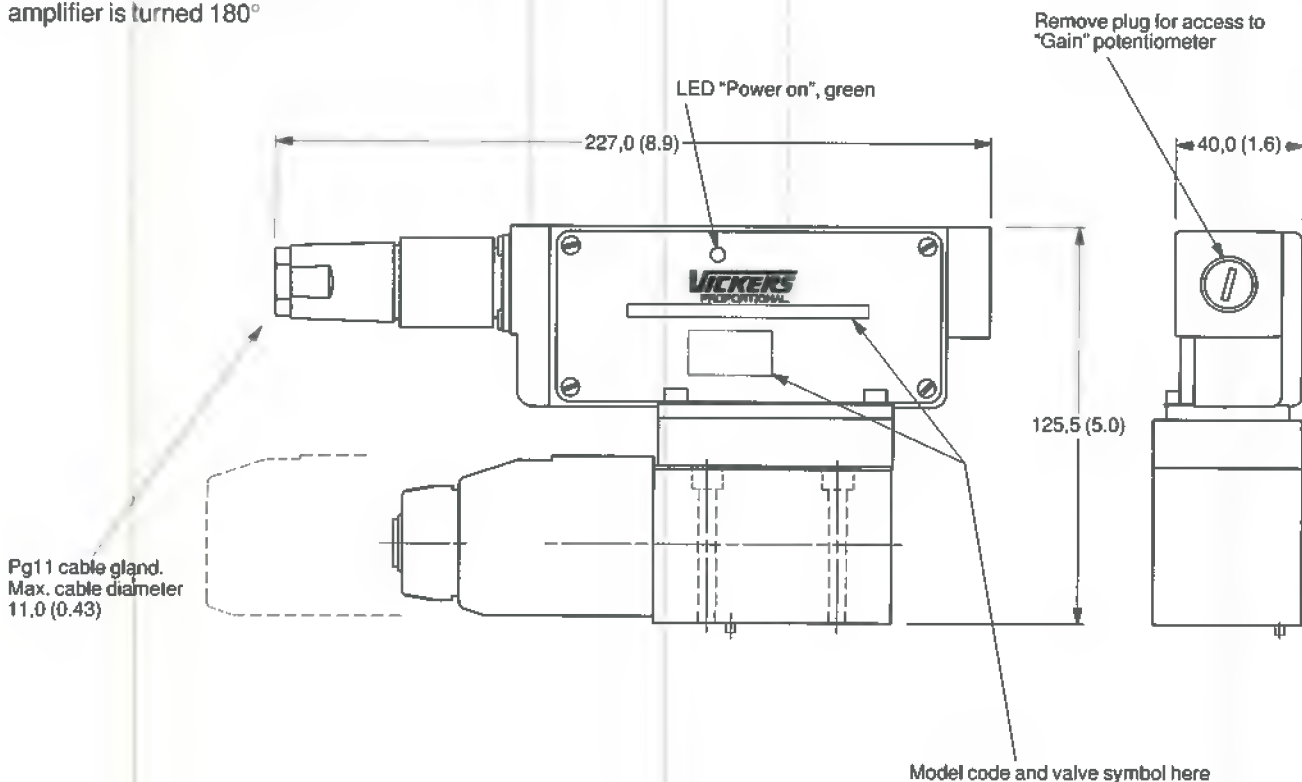
Flow.....1 l/min(0.26 USgpm)

Volume under pressure25 cm³
(3.86 in³)

Model code	Pressure step	Time
40	1 to 40 bar (14.5 to 580 psi)	18 ms
100	2 to 100 bar (29 to 1450 psi)	20 ms
160	4 to 160 bar (58 to 2320 psi)	23 ms
250	4 to 250 bar (58 to 3625 psi)	28 ms
350	5 to 350 bar (72.5 to 5075 psi)	35 ms

KACG-3-***-PD7-H1-10

For KACG-3-L-***-PD7-H1-10, solenoid is mounted on "A" end of body, and amplifier is turned 180°



9. Installation Data

Mounting Attitude

There is no restriction on mounting attitude.

Connection from Port T

Port T should be piped directly to the reservoir with minimum restriction, because back pressure at this port is additive to the controlled pressure at port P. The recommended max. pressure at port T when the valve is controlling pressure is 2 bar (29 psi); the max. permissible pressure at port T is 210 bar (3045 psi).

Mounting Bolt Kits

Metric thread M5-6gBK466835-M
Inch, 10-24UNCBKDG3698

Notes:

1. Bolts should be torqued to 7-9 Nm (63-80 lbf in) with threads lubricated.
2. If not using Vickers recommended bolt kits, bolts must be to grade 12.9 (ISO 898) or better.

When mounting K(A)CG-3 valves together with Vickers SystemStak™ valves (e.g. DGM C-3 relief valve), determine bolt requirements from the table in SystemStak™ catalog C-2027.

Subplates, Manifolds and Mounting Surface

For BSPF port threads and metric mounting bolt types, refer to data sheet V-1310 (see section "J" of catalog C-2005).

For SAE straight port threads and UNC (or metric) mounting bolt types, refer to data sheet I-517355 (see section "I" of catalog #400).

10. Spare Parts Data

Solenoid Coils

For KCG-3

Coils with ISO 4400 connection, for KCG-3-(L)-***-U-10

12V 02-123992
24V 02-123993

Coils with lead wires, for KCG-3-(L)-***-F**-10

12V 02-123994
24V 02-123995

For KACG-3

Coils not available for field replacement. Valves requiring coil replacement should be returned to Vickers.

Seal Kit

For KCG-3 and KACG models 02-138201

Presented by:

VICKERS
A TRINITY Company

Power Plugs for Proportional Valves

EPAD-A/SA/T-1A6-10 series



1. General Description

These plugs, conforming to ISO 4400 (DIN 43650) interface, offer low cost control solutions for direct solenoid operated, non-feedback hydraulic proportional valves, where certain combinations of the following features are required:

- Independently adjustable ramp up and ramp down of output (termed "delay up" and "delay down" respectively)
- Facility to select or cancel ramps (termed "lag cancel"): (type A)
- 3 independent settings of output level: (types SA and T)
- Two in-built timers: (type T)
- Gain adjustment (termed "max."): (type A)
- Deadband compensation (termed "jump" on analog input model): (type A)
- Minimum setting adjustment (termed "null"): (type SA)
- Analog input signal: (type A)
- Adjustable dither

The nominal supply voltage for all three models is 24V DC.

2. Features and Benefits

- Low cost
- Simple to install
- All adjustments can be made at the plug
- Reduction of EMI radiation
- Reduced heat generation
- Fully short circuit and reverse polarity protected
- Double solenoid valves can be controlled from one input signal (+10V to -10V)

3. Application

Control of proportional directional or pressure control valves in a wide variety of industrial machinery and mobile equipment applications where up to three output levels are required with shockless transients during level changes.

4. Model Codes

EPAD - ** - 1A6 - 1*

1

2

3

1 Function

- A = Analog input signal
 - Adjustable ramps
 - Ramp enable function
 - Adjustable gain, deadband and dither
- SA = 3 on/off input signals
 - 3 adjustable output levels
 - 2 adjustable ramps
 - Adjustable minimum output
 - Adjustable dither
- T = On/off input signal
 - 2 adjustable timers
 - 3 adjustable output levels
 - 2 adjustable ramps
 - Adjustable dither

2 Output level

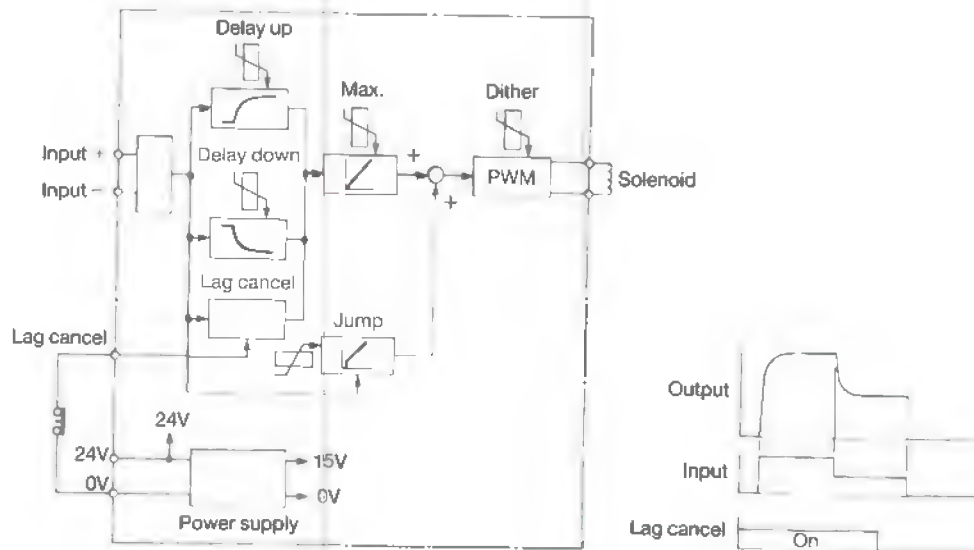
1A6 = 1.6 A output current

3 Design number, 10 series

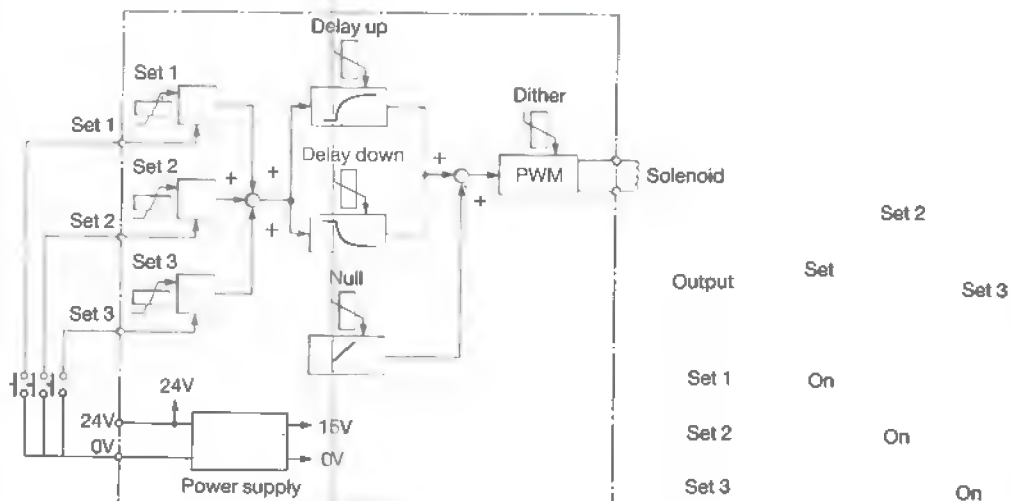
Subject to change. Installation dimensions and performance specification unchanged for design numbers 10 to 19 inclusive.

5. Electrical Block and Function Diagrams

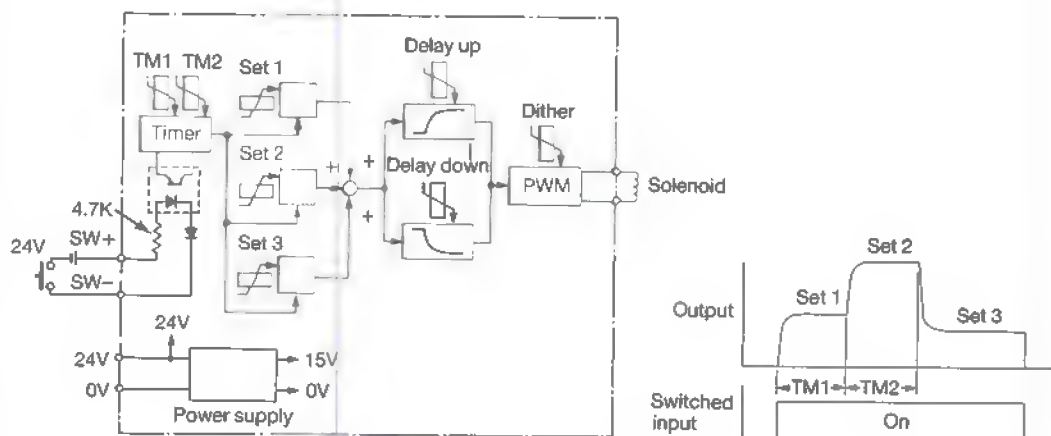
Model type EPAD-A-1A6-11



Model type EPAD-SA-1A6-11



Model type EPAD-T-1A6-11



Presented by:

VICKERS
Ein **TRINOVA** Unternehmen

6. Operating Data

6.1 For all Models

Electrical:	
Power supply	19 to 28V DC inclusive of 10% max. ripple peak-to-peak
Output current	0 to 1.6A
Load resistance	6 to 10 ohms at 20°C (68°F)
Ramp adjustment	4.4 to 100 ms
Dither adjustment range	90 to 300 Hz
Mechanical:	
Mounting interface	ISO 4400 (DIN 43650)
Cable diameter	Ø 6 to 12 mm (0.24" to 0.48" dia)
Wire size	2.5 mm ² (0.004 in ²) max.
Cable clamp	Screw collet type
Protection	IEC 144 class IP65 when installed with seal correctly fitted. Fully short circuit and reverse polarity protected for voltages up to 30VDC
Ambient temperature range	-20°C to 70°C (-4°F to 158°F)
Mass	120g (0.26 lb)

6.2 For Model Type EPAD-A-1A6-11

Input signal:	0 to +10V or 0 to -10V
For output	>76 mV to 10V (+ or -)
For no output	0 to <76 mV (+ or -)
Gain adjustment range	50 to 180 mA/V
Deadband adjustment range	0 to 822 mA

6.3 For Model Type EPAD-SA-1A6-11

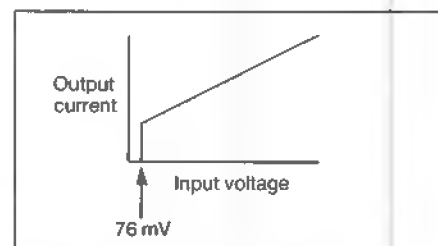
Set 1, Set 2, Set 3 adjustment range	0 to 1772 mA
Null adjustment range	0 to 835 mA

6.4 For Model Type EPAD-T-1A6-11

Set 1, Set 2, Set 3 adjustment range	0 to 1772 mA
Timers:	
TM1 and TM2 adjustment range	0 to 4 sec

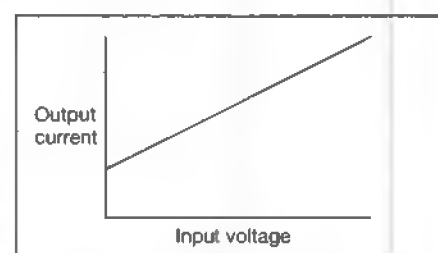
7. Performance Characteristics

Deadband Trimmer (model type A)



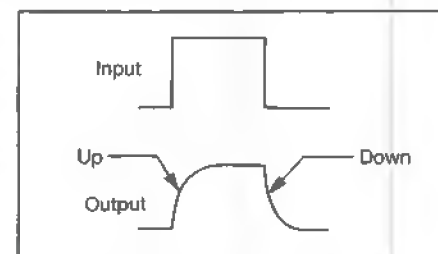
An output current is obtained when the input voltage is 76 mV or more. The level of output current at 76 mV input is set by the "jump" adjustment potentiometer.

Null Trimmer (model type SA)



A minimum output current can be set using the "null" potentiometer.

Ramp Trimmers (all model types)



From a step input signal, the output follows an exponential wave form. The time for rise or fall of the output wave form is adjusted by the "delay up" and "delay down" potentiometers respectively.

The ramp functions do not operate without an input signal.

Ramp Enable (model type A)

Connecting the "lag cancel" terminal to the 0V terminal (permanently or via an external switch) enables the ramp functions.

Dither Trimmer

The frequency of the PWM control is adjusted by the "dither" trimmer.

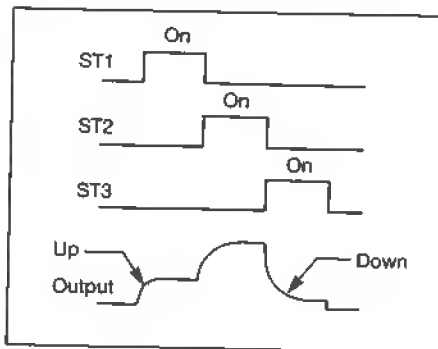
"Set" Trimmers

(model types SA and T)

Three potentiometers, ST1, ST2 and ST3 allow three output signal levels to be set. The switching arrangements are different according to the model type:

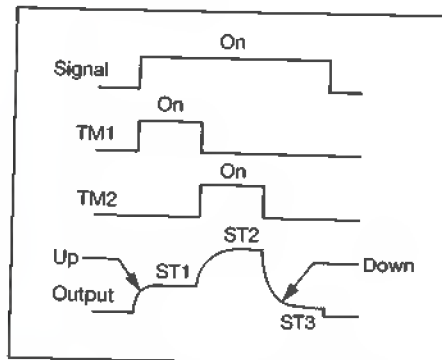
• For model type SA

External switches are required to connect the three separate "set" terminals to the supply 0V terminal.



It is not recommended to have more than one input selected at any one time, except for overlap during change-over from one setting to the next setting. When two or more inputs are on simultaneously, the output is approximately the average of those setting levels.

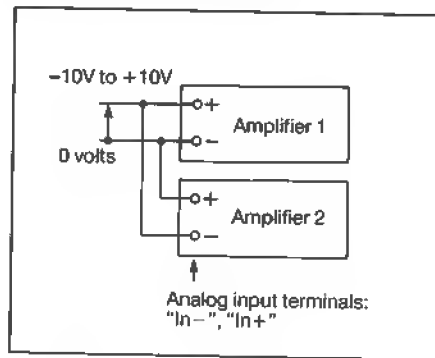
• For model type T



"Set 1" output level is selected for the time set by timer TM1. On completion of run time of TM1, timer TM2 then selects output level "Set 2". On completion of run time of TM2, the output level is as set by "Set 3" as long as the input signal is maintained.

Switching off the input signal gives zero output. The rise and fall of the output signal at each change-over (ST1 to ST2; ST2 to ST3) is controlled by the "delay up" and "delay down" potentiometers.

Use of Model Type A on Double Solenoid Valves



Two plugs can be controlled from one input signal of -10V to +10V as shown. Amplifier plug 1 is controlled when the input signal is 0 to +10V; amplifier plug 2 is controlled when the input signal is 0 to -10V.

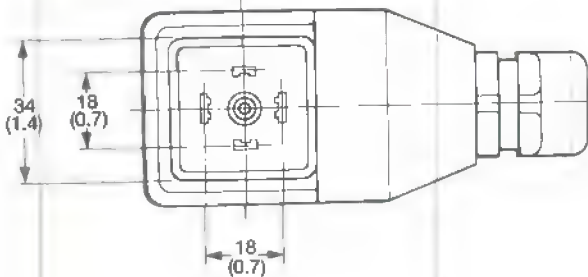
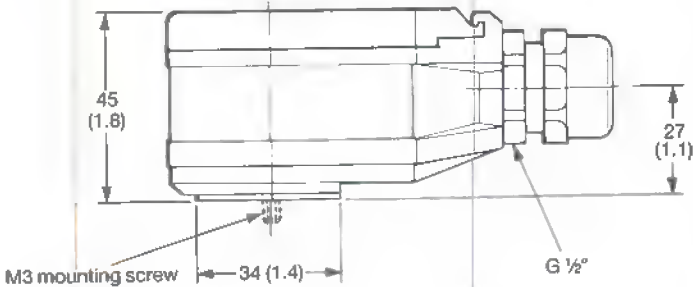
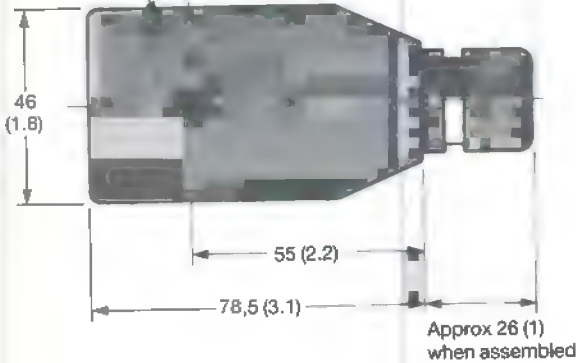
8. Installation Dimensions in mm (inches)

All models

3rd angle projection

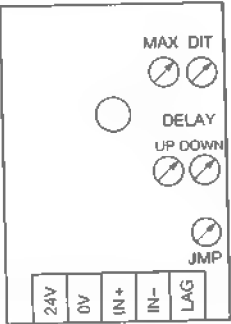


Decal showing location of adjustment potentiometers (see right)

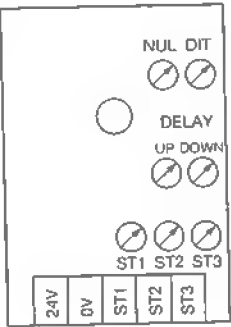


Terminal identification and potentiometer locations

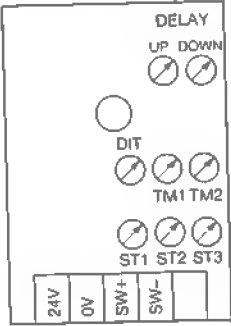
EPAD-A-1A6-11



EPAD-SA-1A6-11



EPAD-T-1A6-11



9. Ordering Procedure

Specify requirements by full model code.

Directional Control Valves

DG3V-5, 10 series

DG5V-5, 10/20 series

ISO 4401 size 05*; NFPA D05*

** With additional pilot ports*

1. Basic Characteristics

Max. operating pressure315 bar
(4567 psi)

Max. flow at max. pressure160 l/min
(42 USgpm)

2. General Description

These valves are used for controlling the starting, stopping and direction of fluid flow.

Two types of control are available:

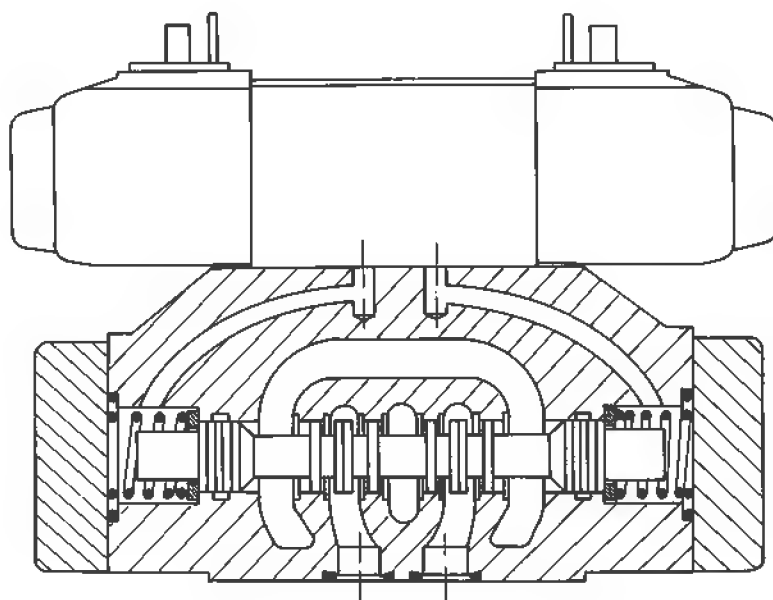
- Hydraulic pilot pressure (DG3V-5 models)
- Integrally-mounted solenoid operated pilot valves (DG5V-5 models) comprising spring-offset,

spring-centered and detented versions. Pilot pressure and drain can be independently configured for internal or external connection.

All spool types have been designed to provide good low-shock, fast-response characteristics which can be enhanced by an optional pilot choke module to control the speed of travel of the main spool.

3. Sectional Illustration

DG5V-5-2C



Interim Information

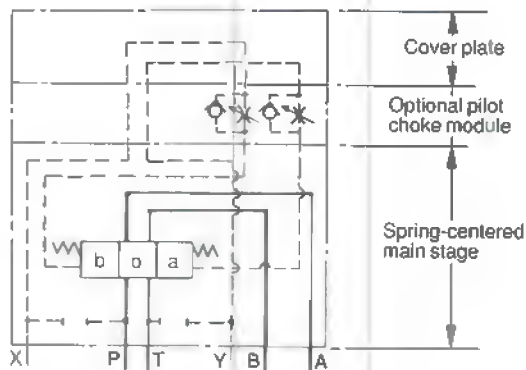
4. Functional Symbols

The diagrams show the spring-centered main stage with:

1. The cover plate and optional pilot choke module available in the DG3V models.
2. The solenoid operated pilot valve types, and the optional pilot choke module available in the DG5V models.

For solenoid identities "a" and/or "b" see page 6.

Direct pilot operated
DG3V-5-**-C



Solenoid controlled, pilot operated
DG5V-5 models

For DG5V-5-**-A



For DG5V-5-**-AL



For DG5V-5-**-B



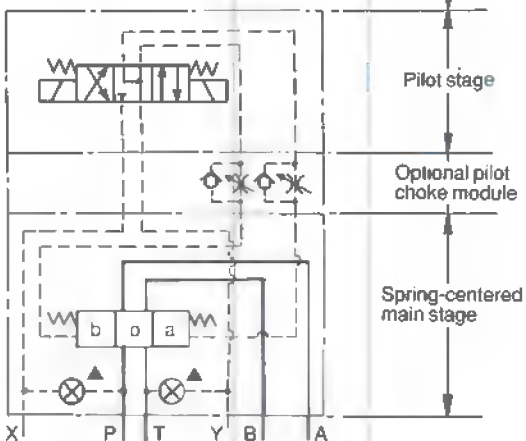
For DG5V-5-**-BL



For DG5V-5-**-N



For DG5V-5-**-C



Example shown: DG5V-5-**-C-2-E-(V)M-****-**-10

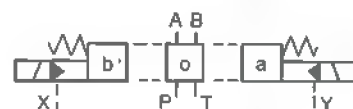
▲ Plugs fitted according to "internal" or "external" pilot supply and drain requirements; see model code positions 5 and 6.

Spool Symbols

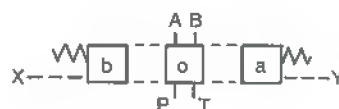
Simplified symbols of 3-position spools showing switching positions "a" and "b", spring-centered position "o" and transient conditions.

3-Position, Spring-centered

Double solenoid controlled, pilot operated
DG5V-5-**-C



Hydraulic pilot operated
DG3V-5-**-C

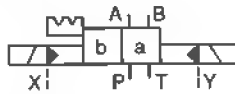


Spool types



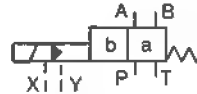
2-Position

Double solenoid, detented, pilot operated
DG5V-5-*N



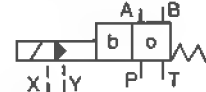
Spools available with this model: * = type 2

Single solenoid, spring-offset, pilot operated
DG5V-5-*A



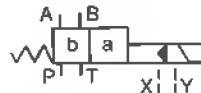
Spools available with this model: * = type 2

DG5V-5-**B



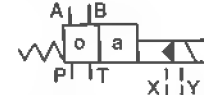
Spools available with this model:
** = 0, 1, 2, 3, 6, 8, 52

DG5V-5-*AL



Spools available with this model: * = type 2

DG5V-5-**BL



Spools available with this model:
** = 0, 1, 2, 3, 6, 8, 52

5. Model Codes

Features in brackets are optional; all other features must be specified when ordering.

For DG5V solenoid-controlled models, other features/options on the DG4V-3/3S 60-design pilot valve may be made available as applicable and subject to quantity required. See catalog C-2015A for details:

- For AC voltages: DG4V-3 (high performance) models
- For DC voltages: DG4V-3S (standard performance) models

For Direct Pilot-operated Models

(F3-)DG3V-5-** ** (-*) -1*

1 2 3 4 14

For Solenoid-controlled, Pilot-operated Models

(F3-)DG5V-5-** ** (-*)(-E)(-T)(*) (-V) M -*** * -* -* -**

1 2 3 4 5 6 7 8 9 10 11 12 13 14

1 Special seals for phosphate esters

Omit for standard seals (see "Hydraulic Fluids" section)

2 Spool type

See "Functional Symbols"

3 Spool spring arrangement

For DG3V-5
C = Hydraulic pilot-operated, 3-position, spring-centered

For DG5V-5 ▲

A = Single solenoid, spring-offset to position "a"; energize solenoid for position "b"

AL = Single solenoid, spring-offset to position "b"; energize solenoid for position "a"

B = Single solenoid, spring-offset to center position "o"; energize solenoid for position "b"

BL = Single solenoid, spring-offset to center position "o"; energize solenoid for position "a"

C = Double solenoid, spring-centered; energize solenoid for position "a" or "b"

N = Double solenoid: energize solenoid for position "a" or "b"; detent held in last selected position ■

▲ All main-stage assemblies are spring-centered. The conditions described depend on the availability of pilot pressure in excess of 4.5 bar (65 psi) to move the spool against these springs. This is particularly important when using external pilot pressure supply.

■ Subject to availability of pilot pressure.

4 Spool shift control

2 = Pilot choke adjustment for both directions of spool travel

Omit if not required

5 Pilot pressure supply

E = Valve configured for external pilot supply to port "X"

Omit for internal pilot supply (port "X" must be blanked off, e.g. at the valve mounting face, when using internal pilot supply)

6 Pilot drain arrangement ♦

T = Valve configured for internal pilot valve drain (port "Y" must be blanked off, e.g. at the valve mounting face, when using internal drain)

Omit for external drain from port "Y"

♦ See 13 for pressure limits

7 Pilot valve manual override option

No symbol = Plain override(s) in solenoid end(s) only

H▼ = Water-resistant override(s) on solenoid end(s)

▼ See catalog C-2015A for details

8 Solenoid identity method

V = Solenoid "A" at port "A" end of pilot valve body and/or solenoid "B" at port "B" end of pilot valve body, independent of main-stage port locations and spool type.

Omit (except as noted below) for

US ANSI B93.7 standard requiring solenoid "A" energization to connect main ports P and A and/or solenoid "B" energization to connect P and B, independent of solenoid location.

Note: The "V" code is always used for valves with type "B" spool as the solenoid identity is the same for both methods of identification.

9 Start of electrical features

M = Start of electrical features codings

10 Solenoid type/connection(s)

U = ISO 4400 (DIN 43650) mounting ✦
 FJ = M20 thread conduit box
 FTJ● = M20 thread conduit box with terminal connector strip
 FW = 1/2" NPT thread conduit box

FTW● = 1/2" NPT thread conduit box with terminal connector strip

✦ Female connector to be supplied by customer.
 ● See catalog C-2015A for details.

11 Indicator lights

For FTJ and FTW type coils only

L = Lights fitted (e.g. FTJL, FTWL)

No symbol = Lights not fitted

For U-type coils use separate plug with integral light; see catalog C-2015A for details.

12 Coil rating

A = 110V AC 50 Hz
 B✦ = 110V AC 50 Hz/120V AC 60 Hz
 C = 220V AC 50 Hz
 D✦ = 220V AC 50 Hz/240V AC 60 Hz
 G = 12V DC
 H = 24V DC
 ✦ For 60 Hz or dual frequency

13 Port T or Y maximum pressure †

5 = 100 bar (1450 psi), for DC solenoids only

6 = 160 bar (2300 psi), for AC solenoids only

† This pressure rating (determined by the pilot valve drain port) is applicable to:

1. Port T when using internal drain, ("T" at position 6)
2. Port Y when using external drain, (no symbol at position 6)

14 Design number, 10 & 20 series

Subject to change. Installation dimensions unaltered for design numbers 10 to 19/20 to 29 inclusive.

10 = DG5V-5 with AC solenoids DG3V-5

20 = DG5V-5 with DC solenoids

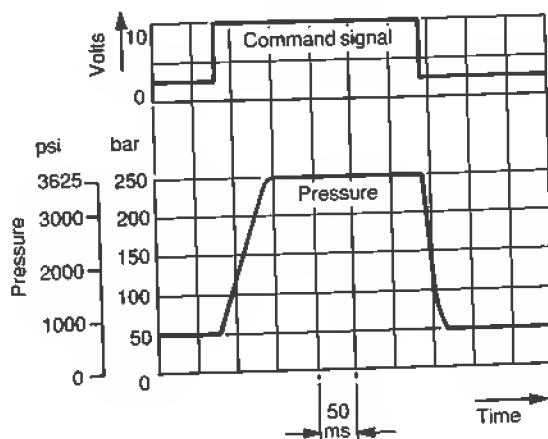
6. Operating Data

Based on petroleum oil at 36 cSt (168 SUS) and at 50°C (122°F).

Maximum pressures	
For DG3V-5: All ports	315 bar (4567 psi)
For DG5V-5 externally drained: Ports P, A, B, T, X Port Y:	315 bar (4567 psi)
With AC solenoids	160 bar (2300 psi)
With DC solenoids	210 bar (3045 psi)
For DG5V-5 internally drained: Ports P, A, B, X, Y Port T:	315 bar (4567 psi)
With AC solenoids	160 bar (2300 psi)
With DC solenoids	210 bar (3045 psi)
Maximum flow	160 l/min (42 USgpm)
Minimum pilot pressure	See "8. Control Data"

For all data related to the DG4V-3/3S 60-design pilot valve, refer to catalog C-2015A

Sample data for KACG-3-250-PD7-H1-10,
measured with flow of 1 l/min
(0.26 USgpm) and 80 cm³ (4.88 in³)
volume under pressure.



Hydraulic Fluids

Materials used in these valves are compatible with anti-wear hydraulic oils, water-in-oil emulsions, water glycols and non-alkyl-based phosphate esters. The extreme operating viscosity range is from 500 to 13 cSt (2270 to 70 SUS), but the recommended running range is from 54 to 13 cSt (245 to 70 SUS). For further information about fluids see "Technical Information" leaflet B-920 or I-286S.

Filtration Requirements

Up to 200 bar (3000 psi): ISO 4406 20/16
Above 200 bar (3000 psi): ISO 4406 18/14

Temperature Limits

Ambient -20°C to +50°C
(-4°F to 122°F)

Fluid temperatures

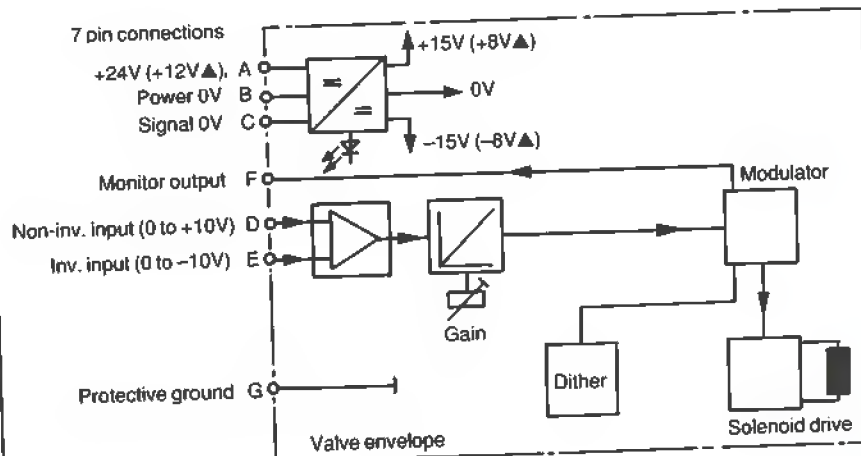
	Petroleum oil	Water-containing
Min.	-20°C (-4°F)	+10°C (+50°F)
Max.*	+70°C (+158°F)	+54°C (+129°F)

* To obtain optimum service life from both fluid and hydraulic system, 65°C (150°F) normally is the maximum temperature except for water-containing fluids.

For synthetic fluids consult manufacturer or Vickers representative where limits are outside those for petroleum oil.

Whatever the actual temperature range, ensure that viscosities stay within the limits specified in the "Hydraulic fluids" section of catalog GB-C-2007B.

7. Electrical Block Diagram, KACG-3



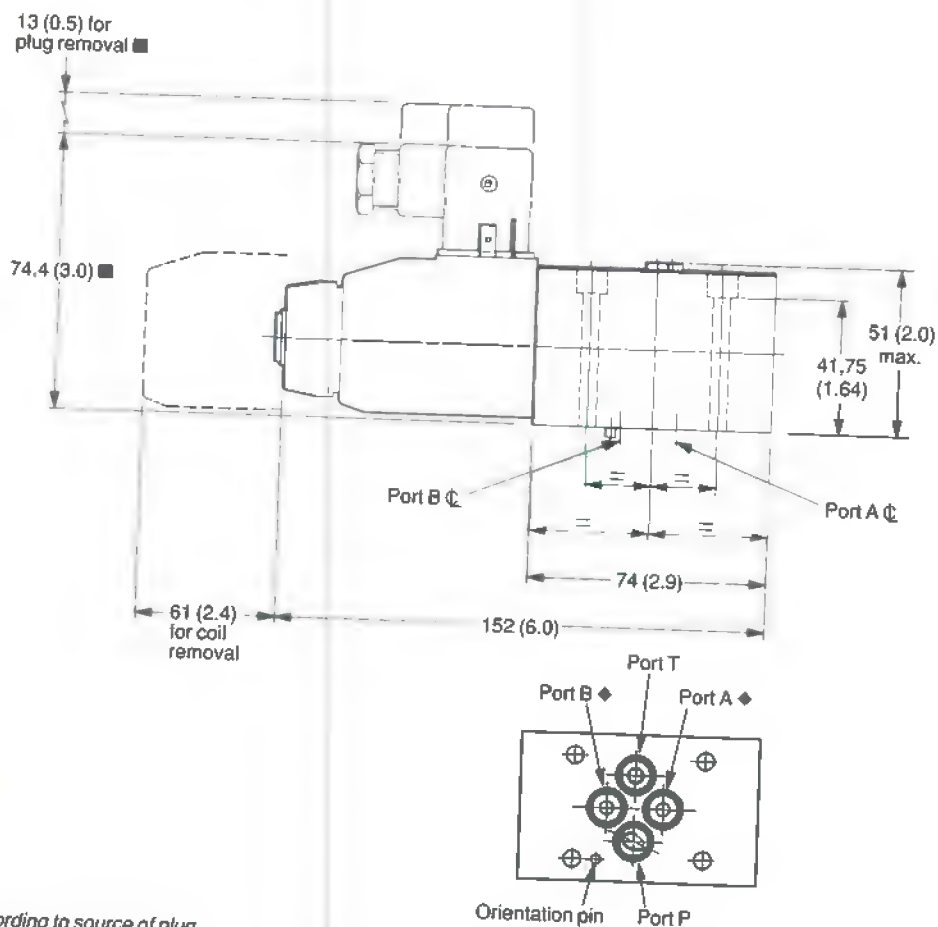
▲ Values for 12V models, "G" in model code [5]
All other values for 24V models, "H".

8. Installation Dimensions in mm (inches)

KCG-3-***-U-10

For KCG-3-L-***-U-10, solenoid is mounted on "A" end of body

3rd angle projection

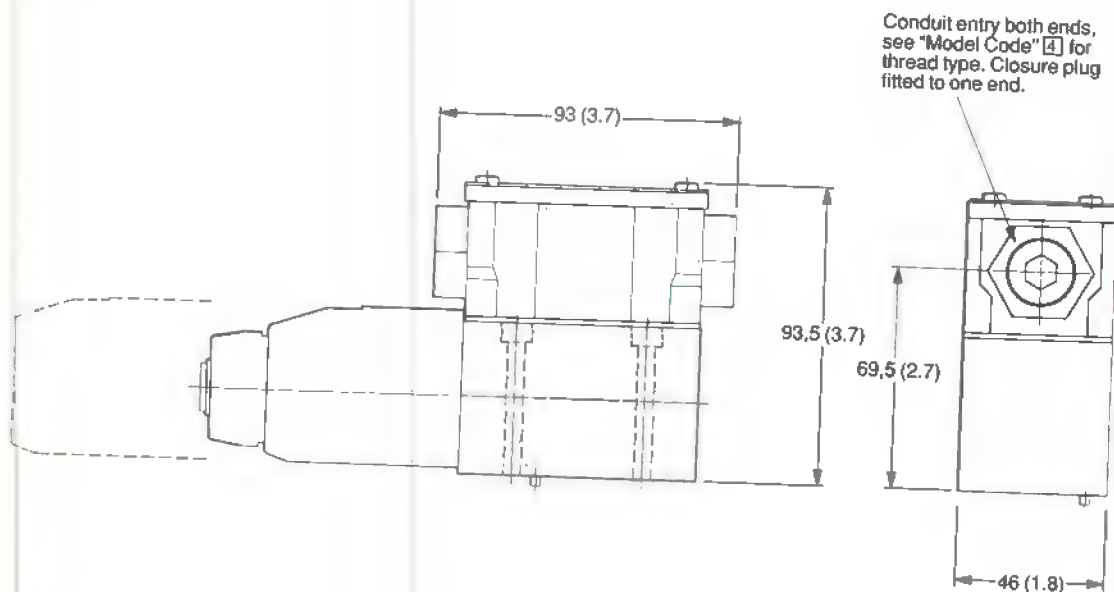


■ May vary according to source of plug.

◆ Ports A and B are blind holes with O-seal recesses.

KCG-3-***-F**-10

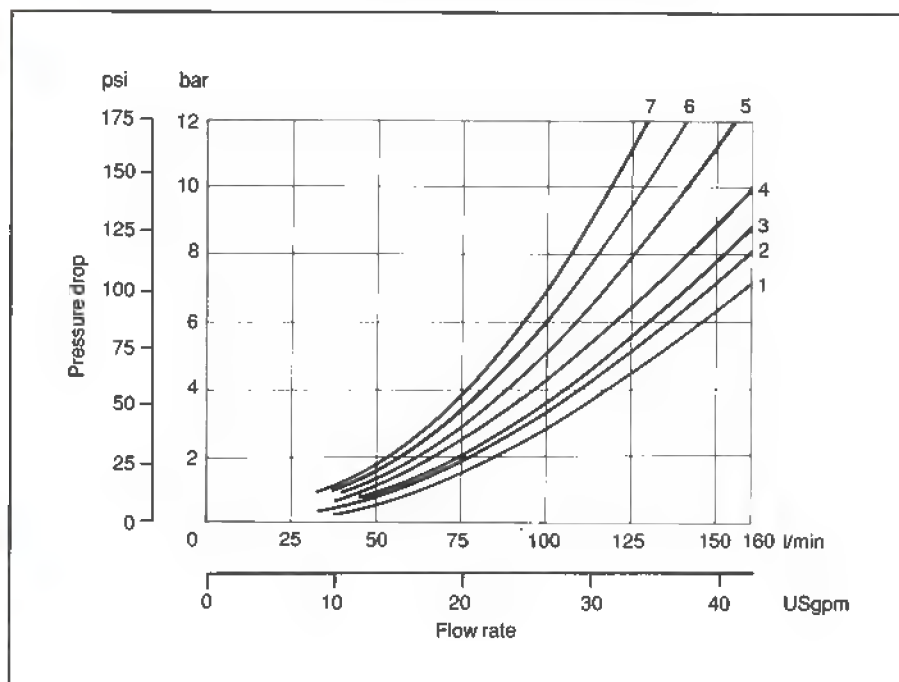
For KCG-3-L-***-F**-10, solenoid is mounted on "A" end of body



7. Performance Data

Pressure Drops

Based on petroleum oil at 36cSt (168 SUS) and at 50°C (122°F).



Spool type	For positions "a" or "b":				For position "o":		
	P to A	B to T	P to B	A to T	A to T	B to T	P to T
0	4	4	1	4	1	3	5
1	1	4	1	4	3	—	6
2	1	2	1	5	—	—	—
3	2	3	1	4	5	—	—
6	1	2	1	3	—	—	—
8	4	2	2	6	—	—	7
11	4	1	3	4	—	7	5
31	3	3	3	4	—	4	—
33	2	2	3	4	—	—	—
52	2	3	3	5	—	—	—

Hydraulic Fluids

These valves are suitable for use with hydraulic oils, water-in-oil emulsions and water glycols.

The extreme operating range is from 500 to 13 cSt (2270 to 70 SUS) but the recommended running range is 54 to 13 cSt (245 to 70 SUS).

Temperature Limits

Minimum ambient -20°C (-4°F)

Maximum ambient

DG3V-5 models	As for fluids, see "Fluid Temperatures" below
DG5V-5 models	
With AC dual frequency coils:	
At 50 Hz and 107% voltage	40°C (104°F)
At 50 Hz and 110% voltage	30°C (86°F)
At 60 Hz and 107% voltage	50°C (122°F)
At 60 Hz and 110% voltage	40°C (104°F)
With AC single frequency (50 Hz) coils:	
At 50 Hz and 110% voltage	40°C (104°F)
With DC coils at 110% voltage	70°C (158°F)

Fluid temperature

	Petroleum oil	Water-containing
Min.	-20°C (-4°F)	+10°C (+50°F)
Max.*	+80°C (+176°F)	+54°C (+130°F)

* To obtain optimum service life from both fluid and hydraulic system, 65°C (150°F) is the recommended maximum fluid temperature, except for water-containing fluids.

For synthetic fluids consult fluid manufacturer or Vickers where limits are outside those for petroleum oil.

Filtration Requirements

Up to 200 bar (3000 psi): ISO 4406 20/16

Above 200 bar (3000 psi): ISO 4406 18/14

8. Control Data

Pilot Pressures

Differential pressure, i.e. pilot pressure at port P (or port X) minus pilot drain pressure at port T (or port Y).

Maximum 315 bar (4567 psi)

Minimum (for max. flow):

For spool types 0, 1,

8♦, 11 4.5 bar (65 psi)

For spool type 6 8 bar (116 psi)

For spool types 2, 3,

31, 33, 52 10 bar (145 psi)

All main stages are spring-centered. Selection of spool offset positions "a" or "b" requires pilot pressure equal to or in excess of the above minimums to move the spool against the spring force. This is particularly important when using external pilot pressure supply.

♦ When using a type 8 spool with the valve configured for internal pilot supply, flow through the valve should be at least 80 l/min (21 USgpm) to generate 4.5 bar (65 psi) pressure drop when the spool is in the center position (flow P to T).

DG5V-5-*N

The spool of the pilot valve of this model is detent-held in its last selected position, and the spool will remain ▲ in this position after the solenoid has been de-energized.

The main stage is spring-centered and requires at least minimum pilot pressure to hold the spool in its offset ("detent held") position. When pilot pressure falls below the recommended minimum, the main-stage spool will move to position "o" under the action of the centering springs. The system designer should ensure that under these conditions the flow condition at center position "o" is appropriate for the application.

▲ See comment in "10. Mounting Attitude"

Pilot Choke Module

This allows the velocity of the main-stage spool to be controlled, thereby reducing transient shock conditions. For best results a constant, low pilot pressure is recommended.

Solenoid Identification

For model code variants:

Position [4], spool spring arrangement

Position [8], solenoid identity method

Model	Spool types	Solenoid identity	
		Main port A end	Main port B end
DG5V-5-*A/B(-*)(-E)(-T)(-**-M	All except "8"	—	B
DG5V-5-*A/B(-*)(-E)(-T)(-**-VM	All except "8" "8" only	— B	A —
DG5V-5-*AL/BL(-*)(-E)(-T)(-**-M	All except "8"	A	—
DG5V-5-*AL/BL(-*)(-E)(-T)(-**-VM	All except "8" "8" only	B —	— A
DG5V-5-*C/N(-*)(-E)(-T)(-**-M	All except "8"	A	B
DG5V-5-*C/N(-*)(-E)(-T)(-**-VM	All spools	B	A

9. Installation Dimensions in mm (inches)

3rd angle
projection



All models

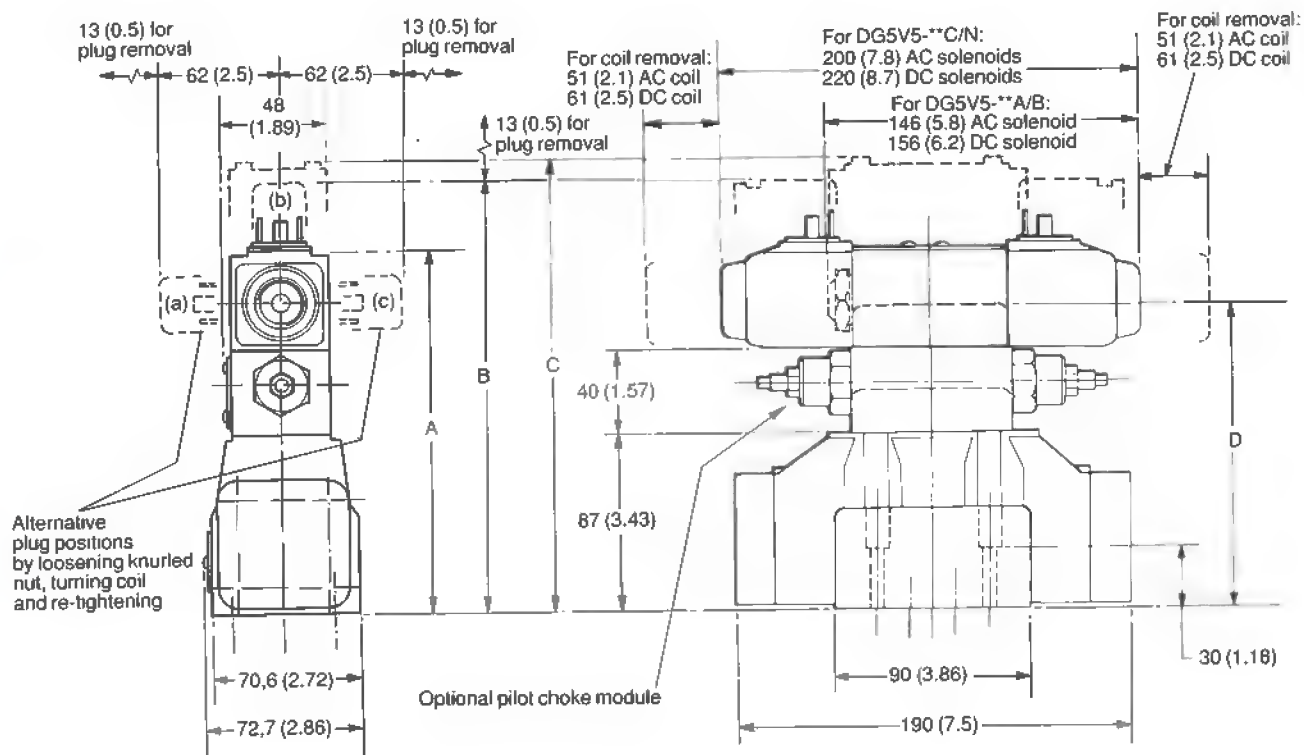
Single solenoid models:

DG5V-5-*A
DG5V-5-**B
DG5V-5-8BL

As shown

DG5V-5-*AL
DG5V-5-**BL
DG5V-5-8B

Solenoid and
pilot valve end
cap interchanged



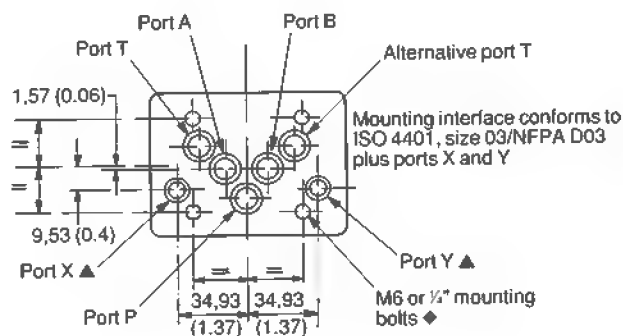
Dimension = max. height for valve build	With pilot choke	Without pilot choke
A = DG5V with ISO 4400 coil connector in position (a) or (c)	178 (7.0)	138 (5.5)
B = DG5V with ISO 4400 coil connector in position (b)	214 (8.5)	174 (6.9)
C = DG5V with conduit box	218 (8.6)	178 (7.0)
D = DG3V	152 (6.0)	112 (4.4)

▲ Mating holes in subplate/manifold block must not exceed $\varnothing 6,0$ (0.25 dia)

◆ Torque values:

Up to 210 bar (3045 psi): 12 to 14 Nm (9 to 10 lbf ft)

Up to 315 bar (4567 psi): 18 to 21 Nm (14 to 16 lbf ft)



10. Mounting Attitude

Unrestricted except for no-spring detented model DG5V-5-*N, which may be affected by severe vibration or shock, especially if a solenoid is not energized.

Hydraulics, electro-
hydraulics, electronics: high
performance products with
quality standards second to
none – for enhanced
productivity and economy.

Vickers components and
systems are used
extensively for in-plant
machinery, mobile vehicles,
automotive equipment,
aerospace and marine
applications.

Presented by:

VICKERS
A TRIMJOVA Company

Air Pilot Operated Directional Control Valve

DG18V-3-*A/B/F(L)-(P2)-(V)-*-60

DG18V-3-*C/N-(V)-*-60



Vickers Incorporated
A TRINOVA Company
5445 Corporate Drive
P. O. Box 302
Troy, Michigan 48007-0302
U.S.A.

Spool Type	Model	Spool
* 0	A	617498
	B, C, F	617121
	N	890189
** 1, 11	B, C, F	458263
* 2	A	617120
	B, C, F	617118
	N	617126
**** 22	A	617122
*** 3, 31	B, C, F	617124
33	B, C, F	617123
* 6	A	890188
6	B, C, F	617119
	N	617341
**** 7	A	458151
7	B, C, F	617125
***** 8	B, C, F	458950

SPOOL ASSEMBLY NOTE:

* Assemble type "0A", "2A", and "6A" spool in body with longer end land opposite of operator.

** Assemble type "1" spool in body with narrow center land towards "A" port.

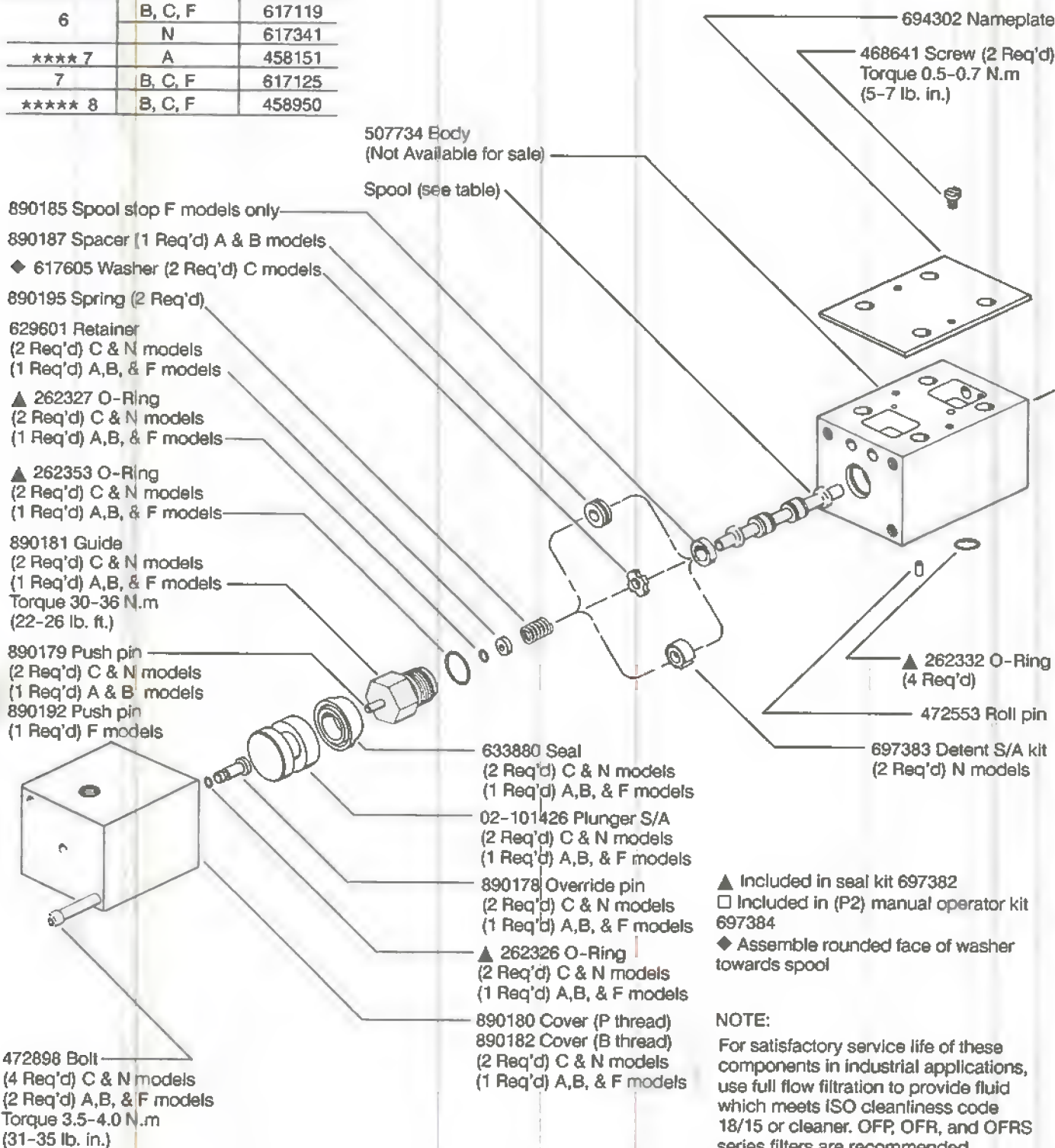
Assemble type "11" spool in body with narrow center land towards "B" port.

*** Assemble type "3" spool in body with narrow center land towards "A" port.

Assemble type "31" spool in body with narrow center land towards "B" port.

**** Assemble type "7A" and "22A" spool in body with reduced longer end Dia. towards operator.

***** "V" Option, operator "A" is at port "A" end of valve and/or operator "B" is at port "B" end of valve, independent of spool type. Type 8 spool valves will always have a "V" present in model code.



507724 End cap
Torque 30-36 N.m
(22-26 lb. ft.)

▲ 262353 O-Ring

890195 Spring (Ref.)

◆ 617605 Washer

DG18V-3-*A-60 Refer to opposite end
for balance of part numbers.

507724 End cap
Torque 30-36 N.m
(22-26 lb. ft.)

▲ 262353 O-Ring

890195 Spring (Ref.)

◆ 617605 Washer

DG18V-3-*B-60 Refer to opposite end
for balance of part numbers.

507724 End cap
Torque 30-36 N.m
(22-26 lb. ft.)

▲ 262353 O-Ring

890195 Spring (Ref.)

◆ 617605 Washer

890186 Spacer

DG18V-3-*C-60 Refer to opposite end
for part numbers

DG18V-3-*F-60 Refer to opposite end for
balance of part numbers.

DG18V-3-*N-60 Refer to "C" layout for
part numbers

VALVE ASSEMBLY NOTE:

Right hand assembly shown for all single
operator models.

For left hand assembly, DG18V3-*A-(P2),
all parts are reversed except body.

For left hand assembly, DG18V3-*B-(P2)
and DG18V3-*F-(P2), all parts are
reversed except body and spool.

Model Code

D G 18 V -3- * * (L) - (P2) - (V) -* - 60



1 Directional control valve, subplate mounted

2 Air pilot operated

3 Rated pressure

350 bar (5000 psi)

4 Interface

ISO 4401-03 (CETOP 3, NFPA D03)

5 Spool type (Center condition)

- 0 - Open center (All ports)
- 1 - Open center (P & A to T)
- 2 - Closed center (All ports)
- 3 - Closed center (P & B)
- 6 - Closed center (P only)
- 7 - Open center (T blocked)
- 8 - Tandem center (P to T)
- 11 - Open center (P & B to T)
- 22 - Closed center (Two-way)
- 31 - Closed center (P & A)
- 33 - Closed center (Bleed A & B)

6 Spool spring arrangement

- A - Spring offset to CLY. A, (Single operator)
- B - Spring centered, (Single operator)
- C - Spring centered (Dual operator)
- F - Spring offset, to CLY. A, shift to center (Single operator)
- N - No-spring, detented

7 Build type

- L - Left hand build (Single operator only)
- Blank - Standard right hand build (Single operator only)

8 Manual override option

- P2 - Manual operator in end cap, (single operators) (Applicable for A(L), B(L) & F(L) models only)
- Blank - Overrides in operator end only

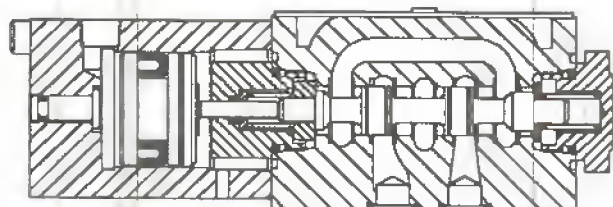
9 Actuator Identity

V - Actuator identifier included for all type 8 spools (Refer to spool assembly note *****)

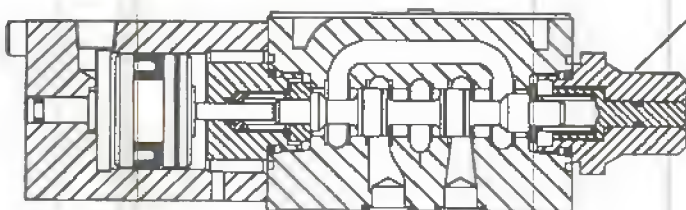
10 Thread connection type

- P - 1/8" NPT threads
- B - 1/8" BSP threads

11 Design number

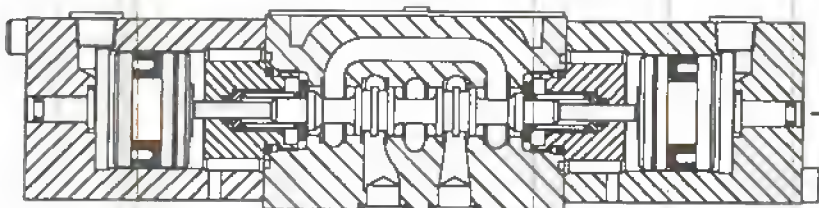


DG18V-3-*A-*-60 Typical spring offset valve / single operator



507971 Plug & pin S/A
Torque 30-36 N.m (22-26 lb. ft.)

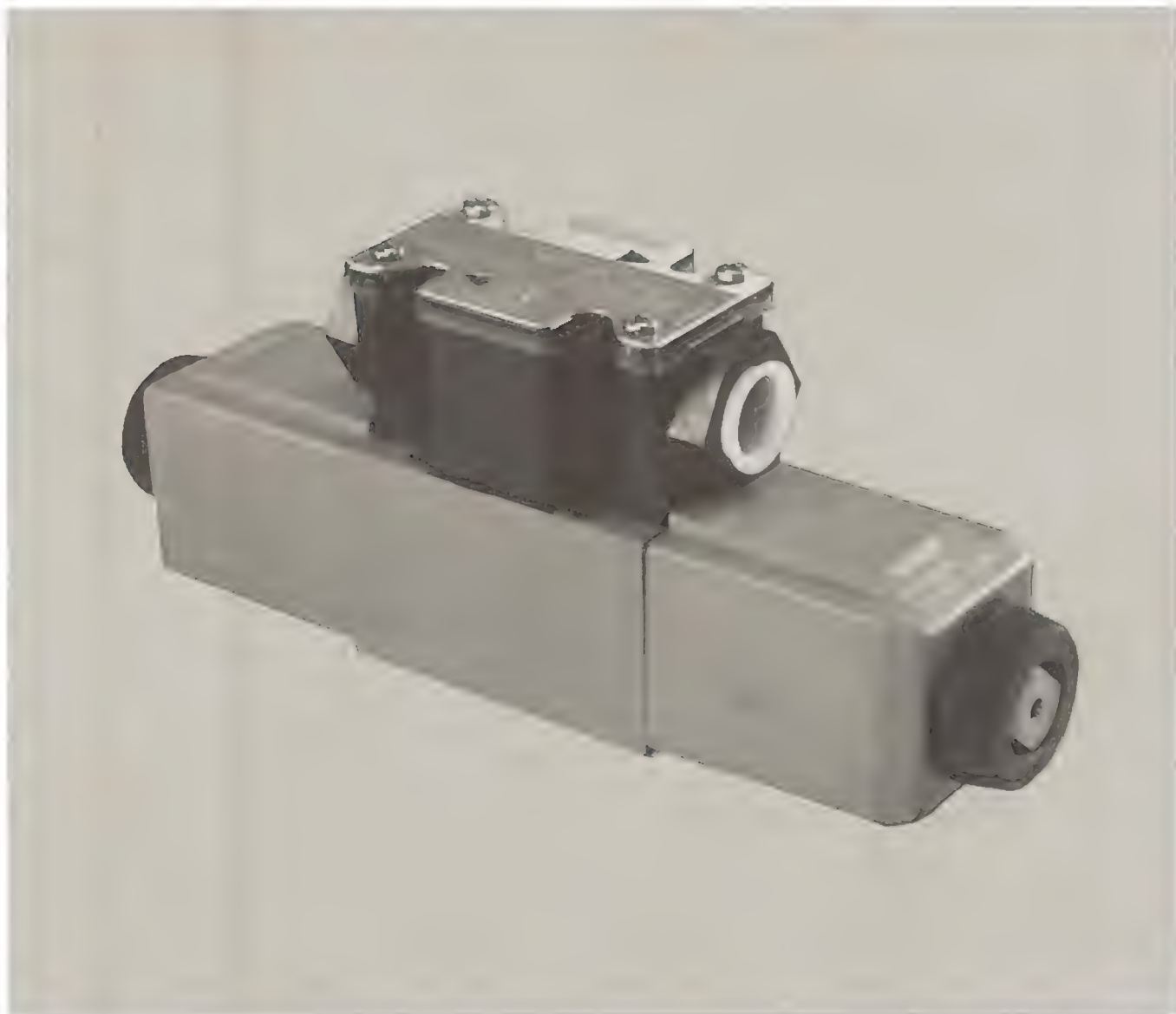
DG18V-3-**-P2-*-60 With manual operator in end cap / single operator



DG18V-3-*C-*-60 Typical spring centered valve / dual operator

Cetop 3 Size Proportional Directional Control Valves

KD/TG4V-3S-*B/C/F(L)--*(V)M-*** (I)-*5-60-(EN**)**

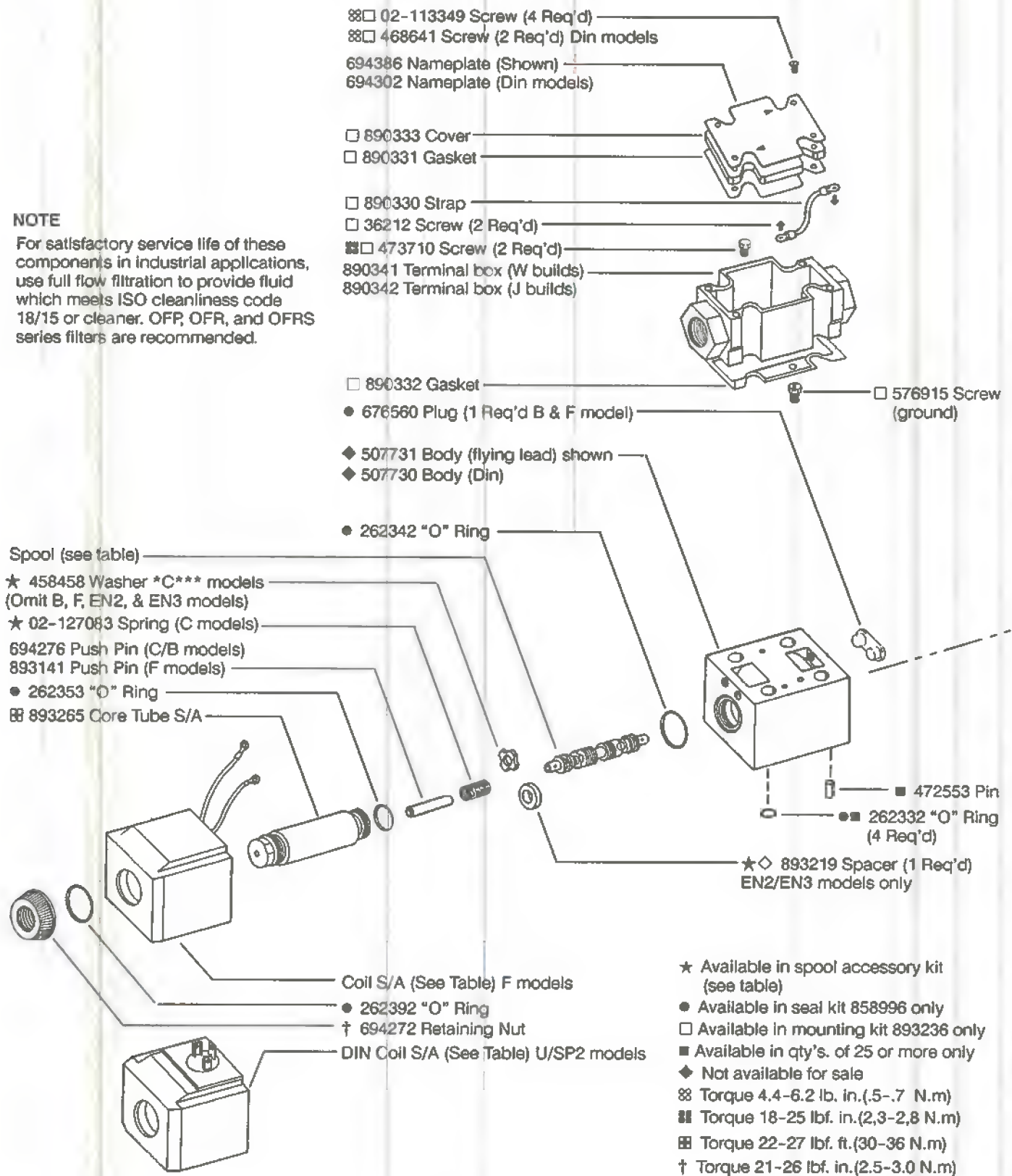


Vickers Incorporated
A TRINOVA Company
5445 Corporate Drive
P. O. Box 302
Troy, Michigan 48007-0302
U.S.A.

COIL- LETTER	COIL S/A F MODELS	COIL S/A U MODELS	COIL S/A SP2 MODELS
G	02-134567	02-134569	
GP	508172	507847	02-111166
H	02-134568	02-134570	
HA	508173	507848	02-111168

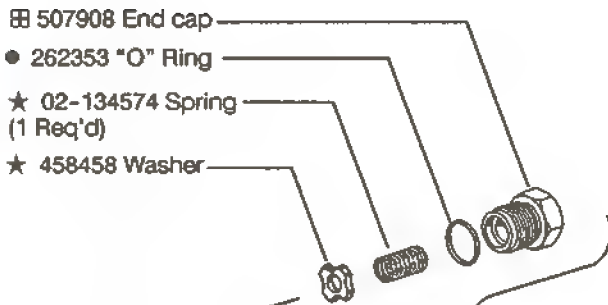
NOTE

For satisfactory service life of these components in industrial applications, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. OFP, OFR, and OFRS series filters are recommended.



NOTE

See service drawing I-3886-S for options not shown.

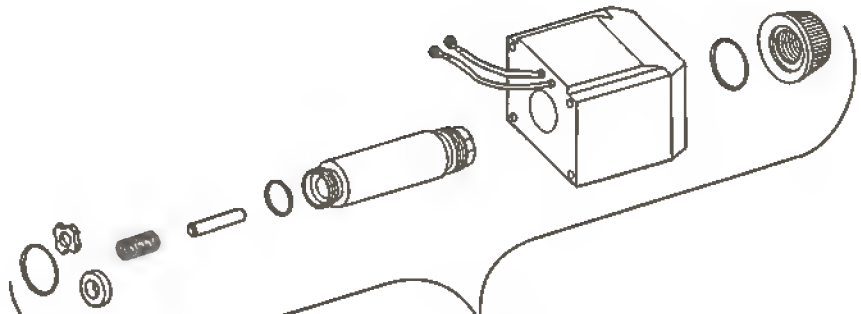


NOTE

KTG4V-3S-*B(L)-(V)M-FW-60**
Spring Centered, Sol. "A" Removed
Refer to other end of valve for common part numbers except as noted.

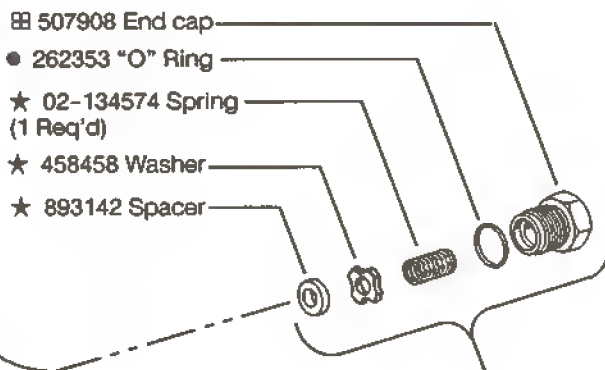
NOTE

Right hand assembly shown for all single solenoid valves, for left hand assembly all parts are reversed except body.



NOTE

KDG4V-3S-*C*N-(V)M-FW-60-(EN2/3)
KDG4V-3S-*C-(V)M-FW-60-(EN4)**
Spring Centered, Dual Solenoid
Refer to other end of valve for common part numbers except as noted.



NOTE

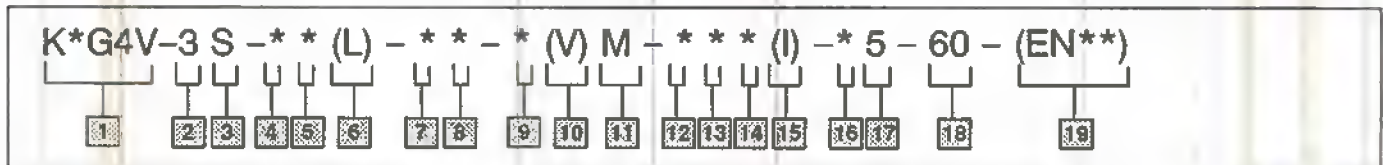
KTG4V-3S-*F(L)-(V)M-FW-60**
Spring offset to CYL. "A", shift to center
Refer to other end of valve for common part numbers except as noted.

SPOOL NOTES

☆ Assemble type 2C15S-EN4 spool with long land over "A" port.
◇ Assemble spacer 893219 on "A" port end for 3C15N-EN2 spool and on "B" port end for 131C15N-EN3 spool.
Assemble spool with notched land over "A" port for both EN2 and EN3 models.
♣ Assemble spool with long land over "B" port.
⌘ Assemble spool with long land over "A" port.

MODEL	SPOOL	TYPE	SPOOL ACCESSORY KIT
-*C***	893131	2C19S	697373
	893132	2C19N	
	893127	2C08S	
	893128	2C08N	
	893129	2C15S	
	893130	2C15N	
	893138	33C08A	
	893139	33C15A	
	893220	33C22A	
	893134	☆ 2C15S-EN4	
-*B**N	893133	◇ 3C15N-EN2	697376
	893133	◇ 131C15N-EN3	
	893137	♣ 2*19N	
-*F**N	893136	♣ 2*08N	697374
	893221	♣ 2*15N	
	893137	⌘ 2*19N	697375
	893136	⌘ 2*08N	
	893221	⌘ 2*15N	

Model Code



1 K - Proportional
D - Directional control valve
T - Throttle valve
G - Subplate mounted
4 - Solenoid operated
V - 350 Bar (5075 psi) P, A, & B ports

2 Interface
3 - ISO-4401-03 CETOP 3 (NFPA D03)

3 Standard performance
S - Standard performance

4 Spool type (see table)

5 Spool/Spring arrangement
B - Spring centered, sol. A removed
C - Spring centered, dual solenoid
F - Spring offset to cyl. A, shift to center

6 Build type
L - Left hand build single solenoid models only
Blank - Standard right hand build

7 Spool flow rating
(@ 10 bar (145 psi) pressure drop)
08 - 8 L/min. (2 USgpm)
15 - 15 L/min. (4 USgpm)
19 - 19 L/min. (5 USgpm)

8 Metering condition
S - Meter-out (only)
A - Meter-in (only)
N - Meter-in and Meter-out

9 Manual override options
Blank - Plain override solenoid ends only
H - Waterproof override solenoid end only
P2 - Plain override both ends of single solenoid models

10 Solenoid Identification
(models with EN2, EN3 or EN4 require V in model code for reverse solenoid identification)

11 Flag
Electrical options & features (refer to service drawing I-3886-S)

12 Coil type
F - Flying lead
U - DIN 43650
SP1 - Single 6.3 mm series spade to IEC 760 (Direct D.C. models only)
SP2 - Dual 6.3 mm series spade to IEC 760 (Direct D.C. models only)

13 Electrical connections (F type coil only) omit if not required
T - Wired terminal block
PA - Instaplug male receptacle only
PB - Instaplug male & female receptacle
PA3 - Three pin connector
PA5 - Five pin connector

14 Housing (F type coils only)
W - 1/2 NPT thread wiring housing
J - 20 mm thread wiring housing

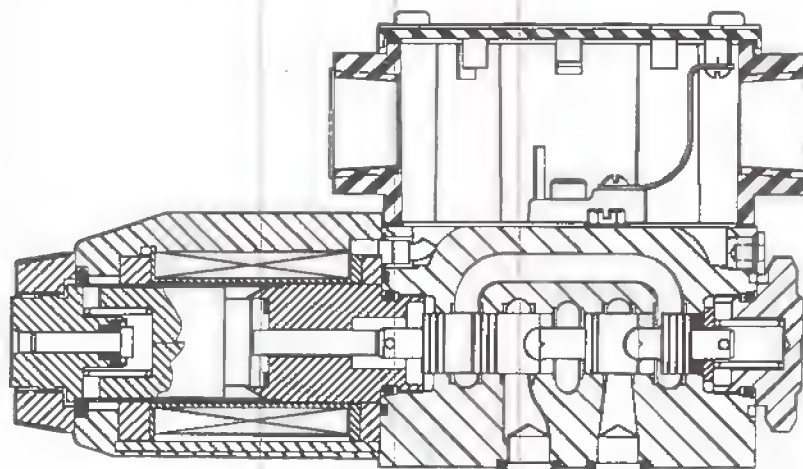
15 Electrical Options
(omit when not required)
I - ISO 4400 with fitted plug
(U models only)

16 Coil identification letter
(see table)

17 Tank pressure rating
5 - 100 Bar (1450 psi)

18 Design

19 Special modifications
(omit if not required)



Typical sectional view, KTG4V-3S-*F(L)**-(V)M-FW-*5-60 spring offset valve.

Hydraulically Operated Directional Control Valve

DG3V-3- ** *(L)-(T)-(P1)-7-*-60



Vickers Incorporated
A TRINOVA Company
5445 Corporate Drive
P. O. Box 302
Troy, Michigan 48007-0302
U.S.A.

SPOOL/SFRING ARRANGEMENT	DRAIN TYPE	
	INTERNAL	EXTERNAL
	SPOOL NO.	SPOOL NO.
□ 0A	694537	694492
0B	694540	694435
0C	—	694435
0F	694540	—
0N	—	694494
□ 2A	694538	698839
2B	694541	698841
2C	—	698841
2F	694541	—
2N	—	698842
◆ 3B	694542	694436
◆ 3C	—	694436
◆ 3F	694542	—
□ 6A	694539	694493
6B	694543	694437
6C	—	694437
6F	694543	—
6N	—	694495
◇ 0	—	694492
◇ 2	—	698839
◇ 6	—	694493
33B	694544	694438
33C	—	694438
33F	694544	—

SPOOL ASSEMBLY NOTES

- Assemble spools with narrow end land towards A port end of body (Reverse for left hand builds)
- ◆ Assemble type 3 spool with narrow center land toward "A" port
- ◇ Blank - no spring required (refer to model code breakdown)

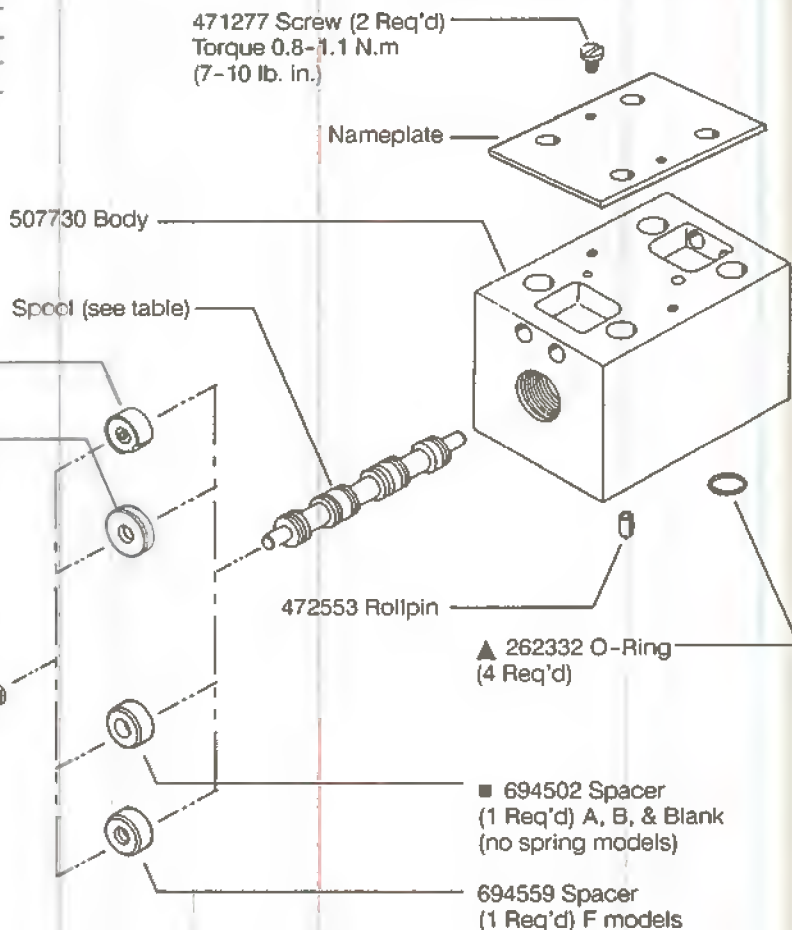
697386 Detent S/A
(2 Req'd N models)

■ 694545 Spacer
(2 Req'd C models)

507889 Spring
(2 Req'd) A, B, C, & F models
Omit for N models

▲ 262353 O-Ring
(2 Req'd all models)

● Plug (see table)
Torque 30-36 N.m
(22-27 lb.ft.)



MODEL	● PLUG (qty.)
DG3V-3-**-7-B-60	694535 (2)
DG3V-3-**-7-S-60	694536 (2)
DG3V-3-***A-7-B-60	694535 (2)
DG3V-3-***A-7-S-60	694536 (2)
DG3V-3-***A-T-7-B-60	694535 (1)
DG3V-3-***A-T-7-S-60	694536 (1)
DG3V-3-***A-T-P1-7-B-60	694535 (1)
DG3V-3-***A-T-P1-7-S-60	694536 (1)
DG3V-3-***B-7-B-60	694536 (2)
DG3V-3-***B-7-S-60	694536 (2)
DG3V-3-***B-T-7-B-60	694535 (2)
DG3V-3-***B-T-7-S-60	694536 (2)
DG3V-3-***B-T-P1-7-B-60	694535 (1)
DG3V-3-***B-T-P1-7-S-60	694536 (1)
DG3V-3-***C-7-B-60	694535 (2)
DG3V-3-***C-7-S-60	694536 (2)
DG3V-3-***F-T-7-B-60	694535 (1)
DG3V-3-***F-T-7-S-60	694536 (1)
DG3V-3-***F-T-P1-7-B-60	694535 (1)
DG3V-3-***F-T-P1-7-S-60	694536 (1)
DG3V-3-***N-7-B-60	694505 (2)
DG3V-3-***N-7-S-60	694557 (2)

NOTE:

For satisfactory service life of these components in industrial applications, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. OFP, OFR, and OFRS series filters are recommended.

▲ Available in seal kit 02-110959

■ Recessed side of spacer to mate with spool end land

507724 End cap (Internal drain models)
Torque 30-36 N.m (22-26 lb. ft.)

■ 694545 Spacer
(A & B models)

694558 Spacer
(F models)

694500 End cap
Torque 30-36 N.m
(22-26 lb. ft.)

▲ 262326 O-Ring

694501 Plunger

■ 694545 Spacer
(A, B, & C models)

694558 Spacer
(F models)

Internal drain models
DG3V-3-***A-T-7-*-60
DG3V-3-***B-T-7-*-60
DG3V-3-***F-T-7-*-60

Refer to other end of valve for balance of
part numbers, except as noted

External drain models
DG3V-3-***A-7-*-60
DG3V-3-***B-7-*-60

Refer to other end of valve for balance of
part numbers, except as noted

External drain model
DG3V-3-***C-7-*-60

Refer to other end of valve for balance of
part numbers

External drain model
DG3V-3-***N-7-*-60

Refer to other end of valve for balance of
part numbers

External drain model (Blank no spring)
DG3V-3-***-7-*-60

Refer to other end of valve for balance of
part numbers, except as noted

694559 Spacer (Use on Blank models
only. Assemble next to spring with
rounded face towards spool.

**Manual override option (A, B, & F
models only, in non-operator end**

DG3V-3-***A-T-P1-7-*-60
DG3V-3-***B-T-P1-7-*-60
DG3V-3-***F-T-P1-7-*-60

Refer to other end of valve for balance of
part numbers, except as noted

VALVE ASSEMBLY NOTE:

Right hand assembly shown for all single
operator models.

For left hand assembly all parts are
reversed except body.

For left hand assembly, external drain B
models all parts are reversed except body
and spool.

Model Code

D	G	3	V	-3-	**	*	(L)	-	(T)	-	(P1)	-	7	-*	- 60
1	2	3	4	5	6	7	8	9	10	11	12	13			

1 Directional control valve

2 Subplate/Manifold mounted

3 Hydraulically operated

4 Rated pressure

V - 350 bar (5000 psi) on P, A & B Ports

5 Interface ISO 4401-AB-03-4-B

3 - NFPA D01, ISO 4401-03, Cetop 3
(with location pin)

6 Spool type

0 - Open center (all ports) (all models)
2 - Closed center (all ports)
(all models)
3 - Closed center (P & B ports)
(B, C, F models only)
6 - Closed center (P port only)
(all models)
33 - Closed center (bleed A & B ports)
(B, C, F models only)

7 Spool/Spring arrangement

Blank - No spring
A - Spring offset (Single operator)
B - Spring centered (Single operator)
C - Spring centered
F - Spring offset, shift to center
N - No-spring detented

8 Left hand build

(Omit if not required)
L - Left hand build A, B & F models only

9 Internal drain

(Omit if not required)
T - Internal drain, (required on F models
available on A & B models)

10 Manual override

(Omit if not required)
P1 - Manual override (A, B, & F models
only in non-operator end) Internal drain
only

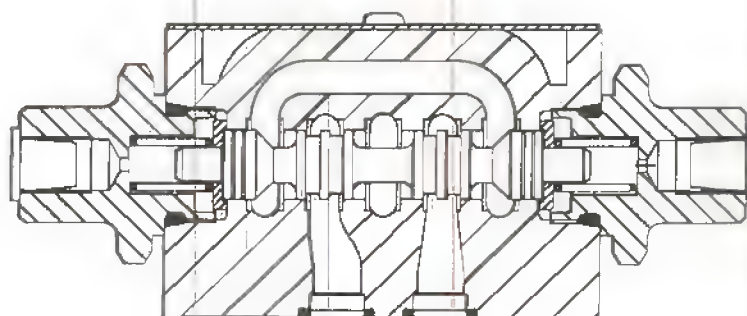
11 Tank pressure limit

7 - 7 - 210 bar

12 Thread for pilot/drain connection

B - G 1/8" threads
S - SAE internal straight thread

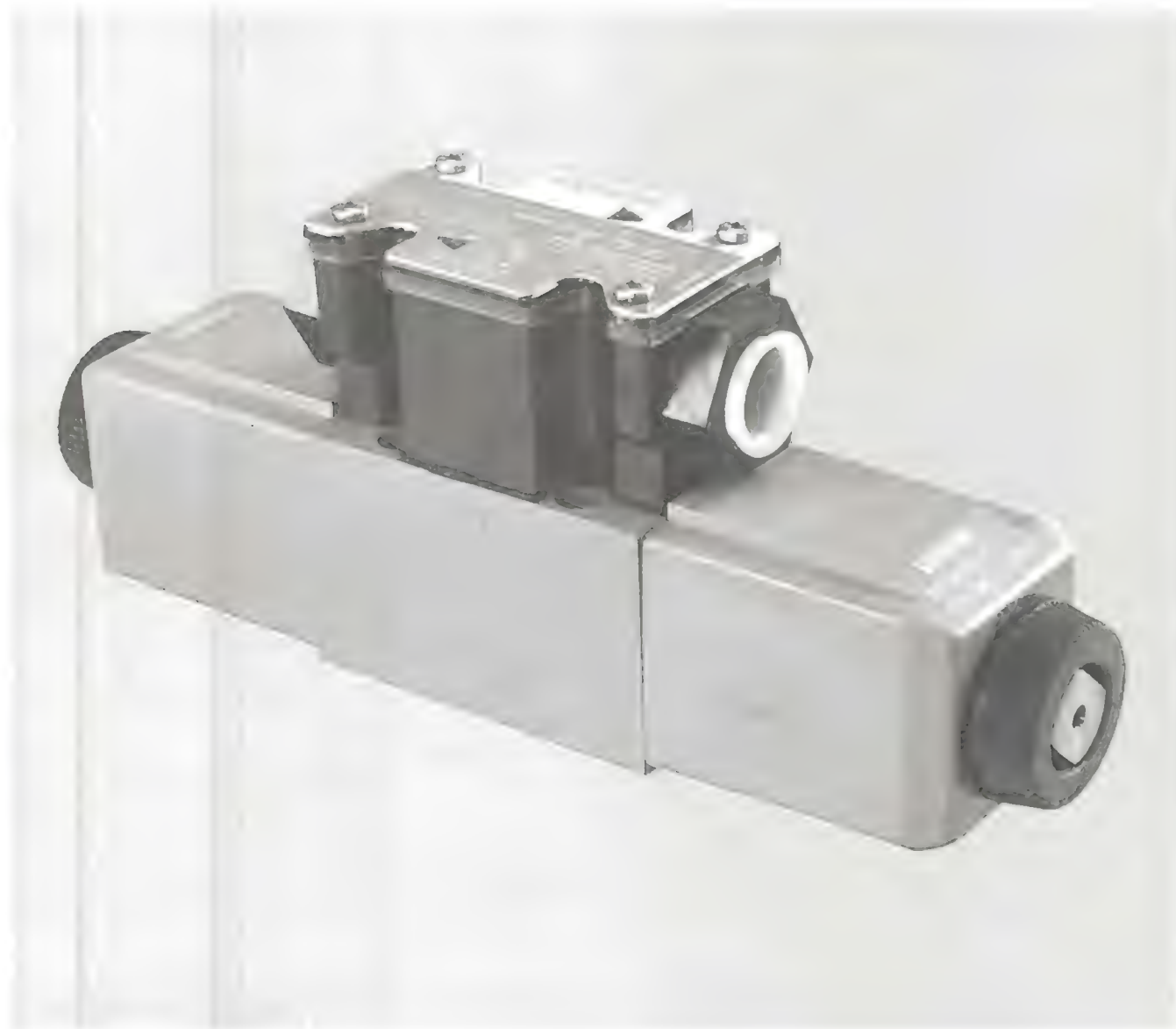
13 Design



Sectional view, spring centered valve

CETOP 3 Size Soft Shift Directional Control Valves

DG4V-3S-*2**(L)-**-(V)M-***** (L)-**5-60-(P**-A**-B**-T**)**



Vickers Incorporated
A TRINOVA Company
5445 Corporate Drive
P. O. Box 302
Troy, Michigan 48007-0302
U.S.A.

Revised 12-01-91

I-3894-S

MODEL	SPOOL	TYPE	SPRING	★ ACCESSORY KIT
-**B/C	892913	2*	507889	697365
	892914	6*	694299	697366
	893319	8*	694299	697366
	892915	33*2	507889	697365
-**A	892916	2A	507889	697365

RESTRICTOR PLUG

Install In P,T,A, Or B As Required

CODE	ORIFICE DIA.	PART #
03	0,30 (0.012)	694341
06	0,60 (0.024)	694342
08	0,80 (0.030)	694343
10	1,00 (0.040)	694344
13	1,30 (0.050)	694345
15	1,50 (0.060)	694346
20	2,00 (0.080)	694347
23	2,30 (0.090)	694348

ORIFICE (1 req'd per core tube)

CODE	PART #	COLOR
00	Orifice omitted	
07	635134	Green
08	635135	Blue
09	893320	Purple

- ⌘ 02-113349 Screw (4 Req'd)
- ⌘ 468641 Screw (2 Req'd) DIN models
- 694886 Nameplate (Shown)
- 694802 Nameplate (DIN models)

- 890333 Cover
- 890331 Gasket
- 890330 Strap
- 36212 Screw (2 Req'd)
- ⌘ 473710 Screw (2 Req'd)
- 890341 Terminal box (W builds)
- 890342 Terminal box (J builds)

- 890332 Gasket
- 576915 Screw (ground)

- ◆ 507734 Body
- ◆ 507731 Body (DIN)

- ▲★ 262342 "O" Ring
- Spool (See table)
- ★ 458458 Washer
- ★ Spring (See table)
- Omit A models this end

* Push Pin

▲★ 262353 "O" Ring

*88 02-135785 Core Tube S/A

Coil S/A (See table) F coils shown
(1 req'd A & B models,
2 req'd C models)

Orifice (See table)
Refer to back page
for orifice changing
procedure.

*892920 Manual actuator S/A

▲★ 262392 "O" Ring

† 694272 Retaining Nut

DIN Coil S/A (See table)
U/SP1/SP2 models
(1 req'd A & B models,
2 req'd C models)

▲ 262332 "O" Ring
(4 Req'd)

■ Restrictor Plug
(see table)

■ 472553 Pin

* Included in core tube S/A

★ Available in spool accessory kit
(see table)

▲ Available in seal kit only 858996

□ Available in mounting kit 893236 only

● Omit for DIN models

■ Available in qty's. of 25 or more only

◆ Not available for sale

⌘ Torque 4.4-6.2 lb. in. (.5-.7 N.m)

⌘ Torque 18-25 lbf. in. (2,3-2,8 N.m)

⌘ Torque 22-27 lbf. ft. (30-36 N.m)

† Torque 21-26 lbf. in. (2.5-3.0 N.m)

⊞ 507908 End cap

▲★ 262342 "O" Ring

Spring (see table)

★ 458458 Washer

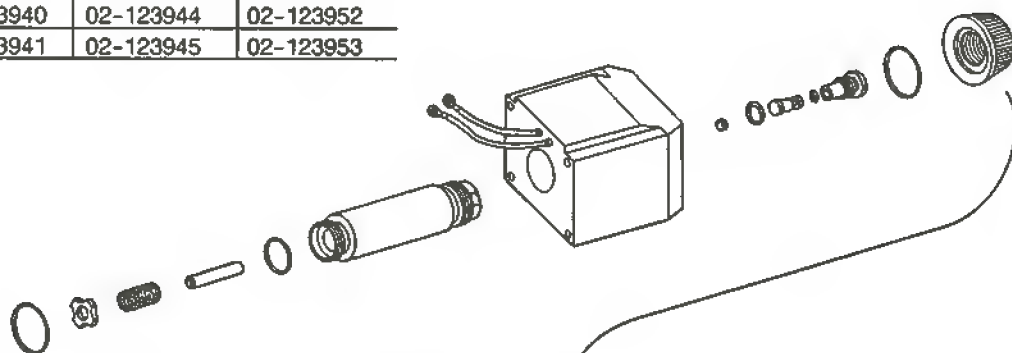
676560 Plug
(2 req'd)

DG4V-3S-*A2**(L)**-(V)M-FW-60
Spring offset to CYL. "A", shift to center
DG4V-3S-*B2**(L)**-(V)M-FW-60
Spring Centered, Sol. "A" Removed
Refer to other end of valve for common
part numbers except as noted.

COIL- LETTER	COIL S/A F MODELS	COIL S/A U MODELS	COIL S/A SP2 MODELS	COIL S/A SP1 MODELS
GH	02-123958	02-123938	02-123942	02-123950
HH	02-123959	02-123939	02-123943	02-123951
DJH	02-123960	02-123940	02-123944	02-123952
PH	02-123961	02-123941	02-123945	02-123953

NOTE

See service drawing I-3886-S for
options.



DG4V-3S-*C2**-(V)M-FW-60
Spring Centered, Dual Solenoid
Refer to other end of valve for common
part numbers except as noted.

⊞ 507972 Plug & manual override S/A

▲★ 262342 "O" Ring

Spring (see table)
(1 Req'd)

★ 458458 Washer

676560 Plug
(2 req'd)

DG4V-3S-*A2***-P2-(L)**-(V)M-FW-60
Manual override in end cap
Refer to other end of valve for common part
numbers except as noted.

NOTE

For satisfactory service life of these
components in industrial applications, use
full flow filtration to provide fluid which
meets ISO cleanliness code 18/15 or
cleaner. OFP, OFR, and OFRS series filters
are recommended.

NOTE

Right hand assembly shown for all single
solenoid valves, for left hand assembly all
parts are reversed except body.

Model code

DG4V		-	3	S	-	*	*	(L)	2	*	*	-	*	-	(V)	M	-	*	*	*	*	(L)	-	*	H	5	-	60	-	(P*-A*-B*-T*)
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20											

- | | | |
|---|---|--|
| <p>1 Valve type
 D - Directional control valve
 G - Subplate mounted
 4 - Solenoid operated
 V - Rated pressure (350 bar)</p> <p>2 Interface
 3 - ISO 4401-03, CETOP 3 (NFPA D03)</p> <p>3 Standard performance</p> <p>4 Spool types
 2 - Closed center (all ports)
 6 - Closed center (P only)
 8 - Tandem center (open crossover)
 33 - Closed center (Bleed A & B)</p> <p>5 Spool/spring arrangement
 A - Spring offset, single solenoid
 AL - Spring offset, single solenoid (Left hand build)
 B - Spring centered, single solenoid
 BL - Spring centered, single solenoid (Left hand build)
 C - Spring centered</p> <p>6 Soft shift valve</p> <p>7 Soft shift orifice size
 00 - No orifice
 07 - .7 mm
 08 - .8 mm
 09 - .9 mm</p> | <p>8 Manual override
 Blank - Override in solenoid end only
 P2 - Manual override in end cap and solenoid, A & B models only</p> <p>9 Solenoid energization identity
 Blank - ANSI B93 energize solenoid A to give flow P to A
 V - Solenoid identification determined by position of solenoid (i.e. solenoid A is at port A end of valve, Solenoid B is at port B end of valve.)</p> <p>10 Flag symbol
 (Introduces electrical features and options)</p> <p>11 Coil types
 F - Flying lead type coils
 U - DIN 43650 coils
 SP1 - Single 1/4" male spade ISAE J858A type 1A
 SP2 - Dual 1/4" male spade ISAE J858A type 1A</p> <p>12 Coil connectors
 ("U" type coils only, omit if not required)
 1 - Connector fitted
 6 - Connector with lights fitted
 11 - Rectifier with lights fitted
 12 - Rectifier fitted</p> | <p>13 Electrical connections
 ("F" type coils only, omit if not required)
 PA - Insta-plug male recpt. only
 PA3 - 3 pin receptacle
 PA5 - 5 pin receptacle
 PB - Insta-plug male & female recpt.
 T - Terminal block</p> <p>14 Wiring housing thread
 ("F" type coils only, omit if not required)
 W - 1/2 NPT
 J - M20 x 1.5</p> <p>15 Solenoid indicator lights
 (Not available on PA, U, SP1, SP2, omit if not required)</p> <p>16 Coil Identification letter
 G - 12V DC DJ - 98V DC
 H - 24V DC P - 110V DC</p> <p>17 Soft shift coil identification</p> <p>18 Tank pressure rating
 5 - 100 bar (1450 psi)</p> <p>19 Design number</p> <p>20 Port orifices
 e.g. "P08" - 0.8 mm orifice in P port (omit if not required)
 03 - 0.30 dia. 13 - 1.3 dia.
 06 - 0.60 dia. 15 - 1.5 dia.
 08 - 0.80 dia. 20 - 2.0 dia.
 10 - 1.0 dia. 23 - 2.3 dia.</p> |
|---|---|--|

Orifice changing procedure

WARNING

- Before breaking a circuit connection make certain that power is off and system pressure has been released. Lower all vertical cylinders, discharge accumulators and block any load whose movement could generate pressure. Plug all removed units and cap all lines to prevent entry of dirt into the system.
- Using a 5/32" hex key, remove manual actuator plug and spring from the end of solenoid (Tightening torque 6.2-7.3 N.m 55-65 lbf.in.)

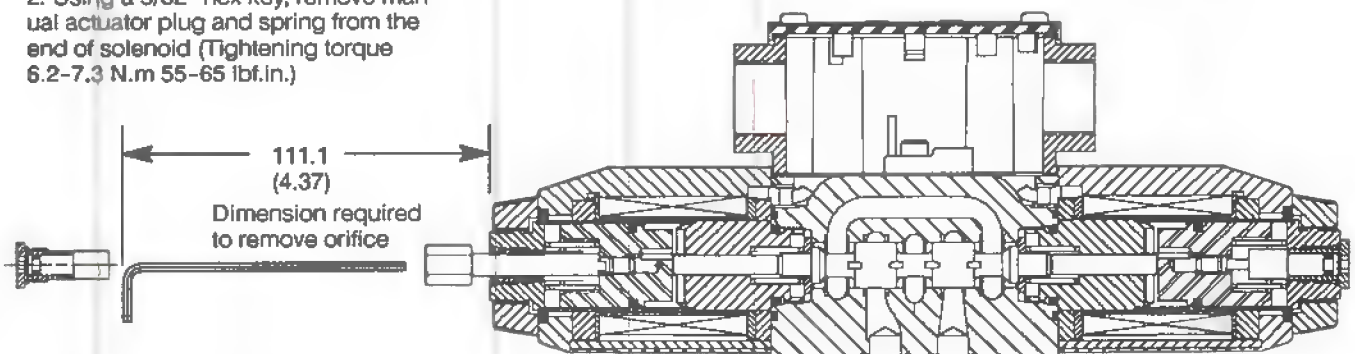
3. Insert extraction tool (878495) into solenoid via the manual actuator opening. Rotate tool until aligned and push pin into slot in armature.

4. Using 1/2" wrench and tool to prevent the armature from rotating, insert 3/32" hex key down the center of tool and remove orifice plug.

5. Replace by the same method, tightening orifice snug to ensure bottoming of threads. Smaller orifices increase response times, larger orifices decrease response time.

Orifice & tool kit 02-140211

For fine tuning shift performance, orifice must be ordered separately. The kit includes (2) each of .7, .8 & .9 mm dia. orifices, (1) installation tool, (1) 5/32" hex key and (1) 3/32" hex key.



Solenoid Controlled Pilot Operated Directional Valve

DG5S-H8-**(L)-(*) (X)-(*)-(E)-(T)(*)-(V)M-(S*)-*(**)**(L)-***-***-60/70

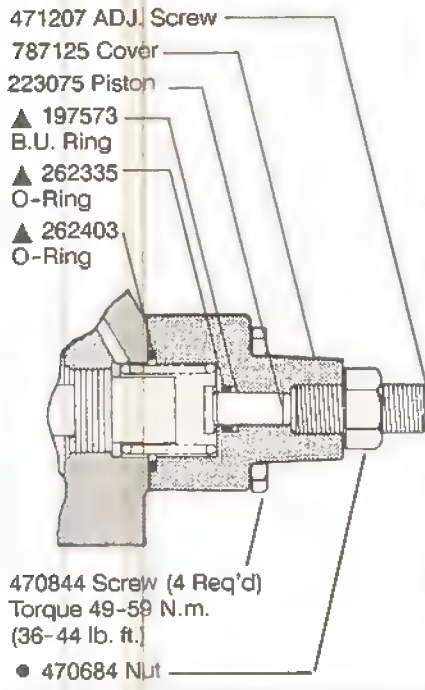


Vickers Incorporated
A TRINOVA Company
5445 Corporate Drive
P. O. Box 302
Troy, Michigan 48007-0302
U.S.A.

Released 05-01-91

I-3889-S

Parts shown included in stroke ADJ. kit 941156. Order two kits if stroke ADJ. is required both ends.



■ PLUG	TORQUES (OILED)	
	N.m.	lb. in.
113000	5.0-5.9	45-52
237588		
343740	15.0-16.0	133-142
398071	9.8-10.2	87-90
407533	12.1-12.4	107-110

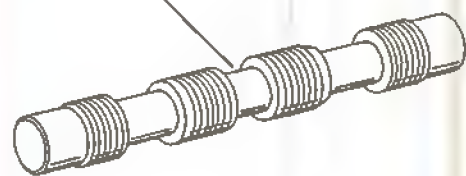
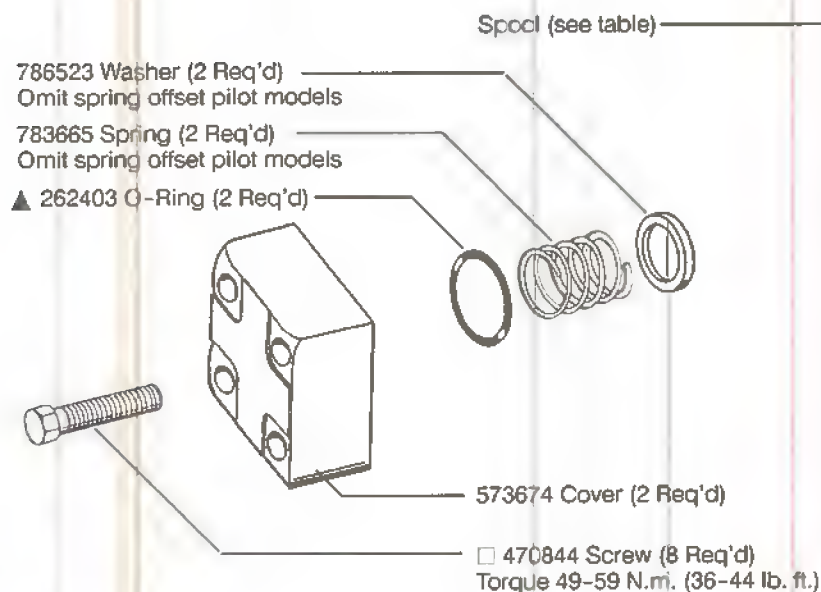
MAIN STAGE SPOOL TYPE	AVAILABLE VALVE TYPE	SPOOL	MAIN STAGE ID PLATE	
			"A" ONLY	B/C/F/N
0	A/B/C//N	786350	400975	400976
1		*786557		400977
2		786349		400978
3		*786558		400979
4		628162		400980
6		786559		400981
8		627221		400980
9		786561		400976
11		*786557		632700
31		*786558		580475
33		786562		400981

*** SPOOL ASSEMBLY NOTE**

Assemble type 1 & 3 spools with narrow center land toward "A" end of valve. "A" end is defined as being closest to CYL. port "A". Type 11 & 31 spools are installed in reverse of type 1 & 3 with narrow center lands toward "B" end of valve.

VALVE MODEL CODE	MAIN STAGE SPOOL TYPE	PILOT VALVE MODEL CODE
DG5S-H8-*A-60	0, 1, 2, 3, 6, 9, 11, 31, 33	DG4V-3S-2A-60
DG5S-H8-*A-70		DG4V-3-2A-60
DG5S-H8-*A-60	4 & 8	DG4V-3S-28A-60
DG5S-H8-*A-70		DG4V-3-28A-60
DG5S-H8-*B-60	0, 1, 2, 3, 6, 9, 11, 31, 33	DG4V-3S-6B-60
DG5S-H8-*B-70		DG4V-3-6B-60
DG5S-H8-*B-60	4 & 8	DG4V-3S-68B-60
DG5S-H8-*B-70		DG4V-3-68B-60
DG5S-H8-*C-60	0, 1, 2, 3, 6, 9, 11, 31, 33, 52, 521	DG4V-3S-6C-60
DG5S-H8-*C-70		DG4V-3-6C-60
DG5S-H8-*C-60	4 & 8	DG4V-3S-68C-60
DG5S-H8-*C-70		DG4V-3-68C-60
DG5S-H8-*N-60	0, 1, 2, 3, 6, 9, 11, 31, 33	DG4V-3S-6N-60
DG5S-H8-*N-70		DG4V-3-6N-60
DG5S-H8-*N-60	4 & 8	DG4V-3S-68N-60
DG5S-H8-*N-70		DG4V-3-68N-60

See pilot valve service drawing for parts breakdown



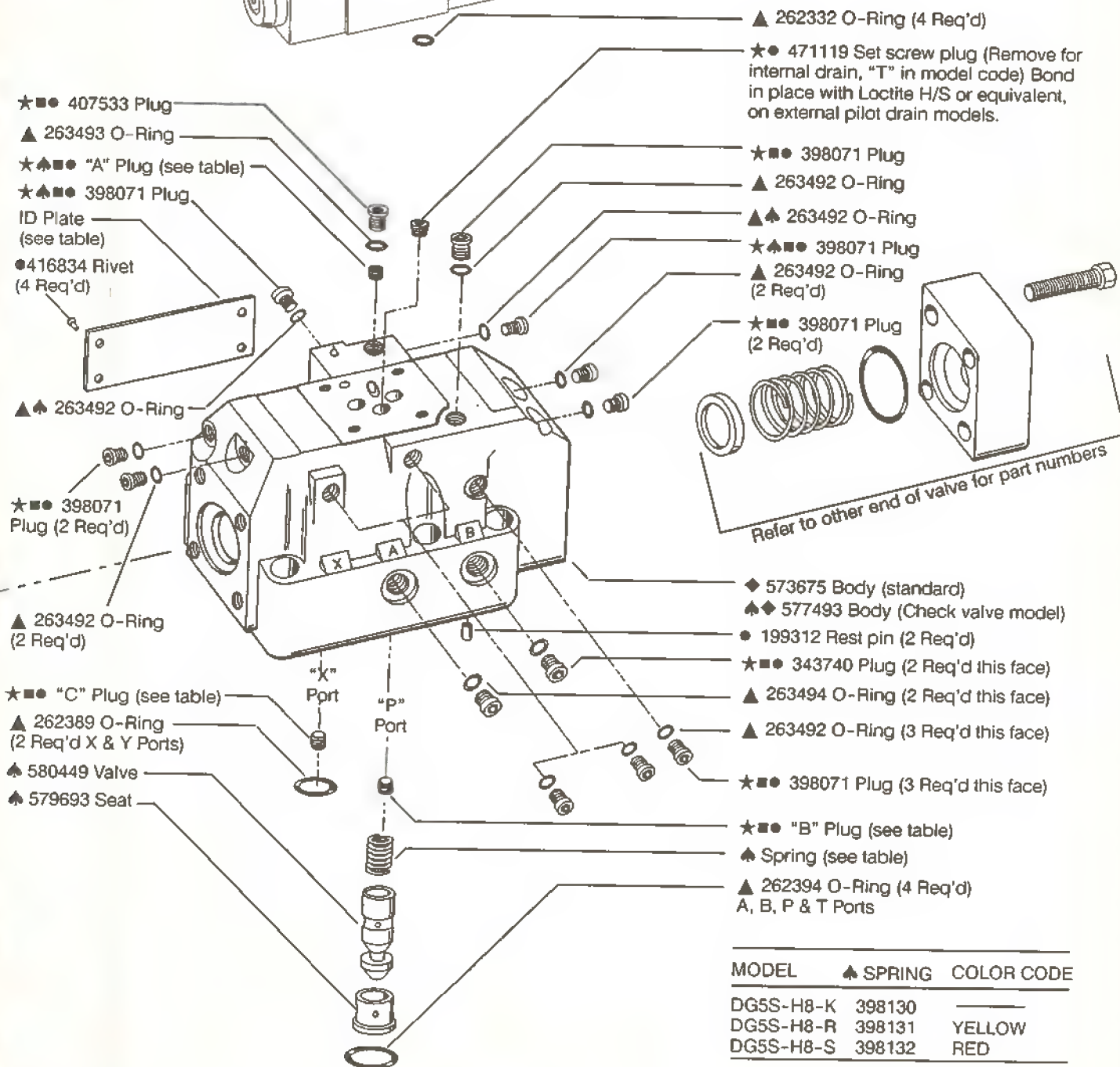
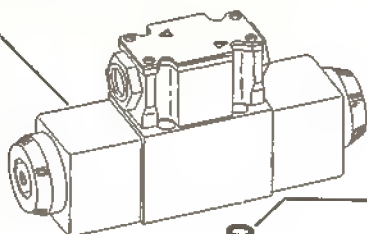
- ▲ Included In F3 Seal Kit 696895
- ★ Included In Plug Kit 941167
- Included In Fastener Kit 941175
- ◆ Not Available For Sale
- ♠ Used On Check Valve Models Only
- Plug Torques (See Table)
- Available Only In Kit Of 25 Each

MODEL	BOLT KIT
W/O Pilot choke	696892
W/ Pilot choke	696893

This solenoid removed on right hand A & B models. Refer to service drawings for more detailed information on left hand valves.

MODEL	"A" PLUG	"B" PLUG	"C" PLUG
DG5S-H8-**-**	DOES NOT EXIST	237588	_____
DG5S-H8-**-**-E		113000	237588
DG5S-H8-**-**-X		_____	_____
DG5S-H8-**-**-X-E		113000	_____
DG5S-H8-**-**-KRS	237588	DOES NOT EXIST	_____
DG5S-H8-**-**-E-KRS	113000		237588
DG5S-H8-**-**-X-KRS	_____		_____
DG5S-H8-**-**-X-E-KRS	113000		_____

★ 237588 Orifice plug



Model Code

(F3)DG5S-H8-*		*	(L)(*)(X)(*)(E)-(T)(*)-(V)M-(S*)(**)	*	*	(L)-**	5-***	-60/70															
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24

1 Seals for mineral oil & fire resistant fluids

2 Directional control valve
Manifold or subplate mounted
Solenoid controlled
Pilot operated
Rated pressure 310 Bar (4500 psi)

3 High flow interface
8 - NFPA-D06 (ISO-4401-08)

4 Spool type (see table)

5 Spool/Spring arrangement
A - Spring offset, to CYL. A
B - Spring centered, sol. A removed
C - Spring centered
F - Spring offset, to CYL. A shift to center
N - No spring detented

6 Left hand
L - Left hand (single solenoid only)
Blank - Omit when not required

7 Manual override option
Blank - Plain override solenoid ends only
H - Waterproof override solenoid ends only
H2 - Waterproof override both ends of single solenoid
P2 - Plain override both ends of single solenoid
Y - Lockable manual overrides solenoid ends only/C only
Z - No overrides in either end

8 Response type
X - Fast response
Blank - Standard low shock models

9 Spool control modifications
1 - Stroke adjustment
2 - Pilot choke adjustment
3 - Pilot choke & stroke adjustment
7 - Stroke adjustment CYL. A only
8 - Stroke adjustment CYL. B only
2-7 - Dual pilot choke & stroke ADJ. A port end only
2-8 - Dual pilot choke & stroke ADJ. B port end only
Blank - Omit when not required

10 Pilot pressure
E - External pilot pressure
Omit - Internal pilot pressure

11 Pilot drain
T - Internal pilot Drain
Omit - External pilot drain

12 Pressure port check valve
K - 0.35 bar (5 psi) cracking pressure
R - 3.45 bar (50 psi) cracking pressure
S - 5.20 bar (75 psi) cracking pressure
Blank - Omit when not required

13 Solenoid energization identity
Blank - Standard arrangement for ANSI B93.9 (energise solenoid A for flow P to A port)
V - Solenoid identification determined by position of solenoid. (Solenoid A at port A end and/or solenoid B at port B end. (All 4 & 8 spools are always V code)

14 Flag symbol heading electrical options & features

15 Spool indicator switch
Available on high performance models, DG4V-3, only.
Omit when not required.
S1 - Options available on U only)
S2 - Options available on U only)
S3 - Options available on P* only
S4 - Options available on P* only
S5 - Options available on FW/FJ only

16 Coil type
U - ISO 4400
F - Flying lead
SP1 - Single 6,3 MM spade to IEC 760
SP2 - Dual 6,3 MM spade to IEC 760

17 Electrical connections (F type coil only) omit if not required
T - Wired terminal block
PA - Instaplug male receptacle only
PB - Instaplug male & female receptacle
PA3 - Three pin connector
PA5 - Five pin connector

18 Housing (F type coils only)
W - 1/2 NPT thread wiring housing
J - 20 mm thread wiring housing

19 Electrical options
1 - ISO with fitted plug, U type coils only
6 - ISO with fitted plug, & lights
U type coils only

20 Solenoid Indicator lights (F build only) used with T terminal block models. (Omit if not required)

21 Coil identification

22 Pilot valve code (tank pressure rating)
2 - 10 bar (145 psi) DG4V3-60
5 - 100 bar (1450 psi) DG4V3S-60
6 - 160 bar (2285 psi) DG4V3-60
7 - 210 bar (3000 psi) DG4V3-60

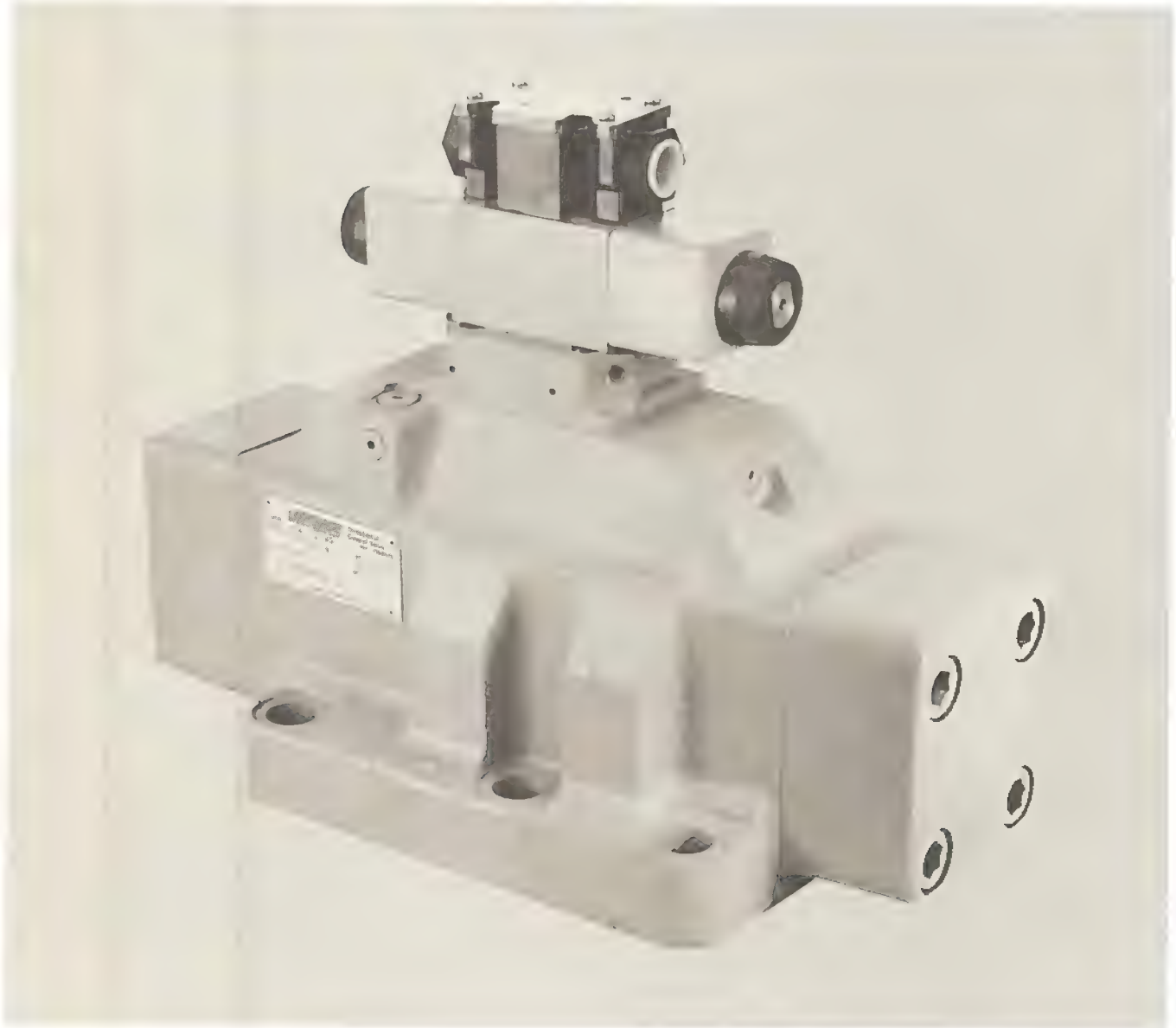
23 Pilot valve port orifices

24 Design
60 - DG4V3S-60 pilot valve
70 - DG4V3-60 pilot valve

6 Thru **23** included in pilot valve model code

Solenoid Controlled Pilot Operated Directional Valves

(F3)DG5S4-10-**(L)**(X)(*)(E)(T)(*)-(V)M-(S*)*(**)**(L)***-***-90/100



Vickers Incorporated
A TRINOVA Company
5445 Corporate Drive
P. O. Box 302
Troy, Michigan 48007-0302
U.S.A.

Released 05-01-91

I-3890-S

MAIN STAGE SPOOL TYPE	AVAILABLE VALVE TYPE	SPOOL	MAIN STAGE ID PLATE	
			"A" ONLY	B/C/N
0	A/B/C/N	364037	400975	400976
1		*331404		400977
2		364038		400978
3		*277479		400979
4		281193		400980
6		364039		400981
8		364041		400980
9		277563		400976
11		*331404		632700
31		*277479		580475
33		364042		400981

* SPOOL ASSEMBLY NOTE

Assemble type 1 & 3 spools with narrow center land toward "A" end of valve. "A" end is defined as being closest to CYL. port "A". Type 11 & 31 spools are installed in reverse of type 1 & 3 with narrow center lands toward "B" end of valve.

■ PLUG INSTALLATION TABLE

MODEL	"A" PLUG	"B" PLUG	"C" PLUG
DG5S4-10*	DOES NOT EXIST	30560	—
DG5S4-10*-E		7074	30560
DG5S4-10*-X		—	—
DG5S4-10*-X-E		—	—
DG5S4-10*-K/R/S	161809	7074	—
DG5S4-10*-E-K/R/S	113000		30560
DG5S4-10*-X-K/R/S	—		—
DG5S4-10*-X-E-K/R/S	113000		—

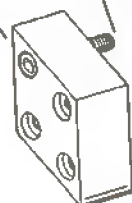
107758 Washer (Remove on A offset models)

280931 Spring (Remove on A offset models)

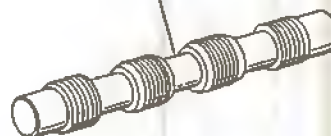
▲ 262409 "O" Ring

□ 298168 Screw (4 Req'd)
Torque 205-230 N.m
(150-170 lb.ft.)

276948 Cover



Spool (See table)



■ PLUG TORQUES (OILED)

PLUG	N.M	lb. in.
7074	8.5-9.6	75-85
30560	8.5-9.6	75-85
113000	5.0-5.9	45-52
161809	5.0-5.9	45-52
343740	15.0-16.0	133-147
363889	20.5-22.5	181-199
407533	12.1-12.4	107-110

NOTE

SAE straight thread plugs used on exterior of valve.

NOTE

Parts included in service kits are not sold separately.

SEAL KIT NOTE

Valves are manufactured as shown with F3 seals used internally. Interface seats are standard Nitrile material and are converted to F3 in the seal kit. All seals in the seal kit are F3.

VALVE CODE	MODEL	MAIN STAGE SPOOL TYPE	PILOT VALVE MODEL CODE
DG5S4-10*A		0, 1, 2, 3, 6, 9, 11, 31, 33	DG4V-3(S)-2A-60
		4 & 8	DG4V-3(S)-2AL-VM-60
DG5S4-10*B		0, 1, 2, 3, 6, 9, 11, 31, 33	DG4V-3(S)-6B-60
		4 & 8	DG4V-3(S)-6BL-VM-60
DG5S4-10*C		0, 1, 2, 3, 6, 9, 11, 31, 33, 52, 521	DG4V-3(S)-6C-60
		4 & 8	DG4V-3(S)-6C-VM-60
DG5S4-10*N		0, 1, 2, 3, 6, 9, 11, 31, 33	DG4V-3(S)-6N-60
		4 & 8	DG4V-3(S)-6N-VM-60

See pilot valve service drawing for parts breakdown

▲ Included In F3 Seal Kit 696898

★ Included In Plug Kit 941263

□ Included In Fastener Kit 941262

◆ Not Available For Sale

♣ Used On Check Valve Models Only

■ Plug Torques (See Table)

● Available Only In Kit Of 25 Each

MODEL ♠ SPRING

DG5S4-10-K	247287
DG5S4-10-R	276428
DG5S4-10-S	432353

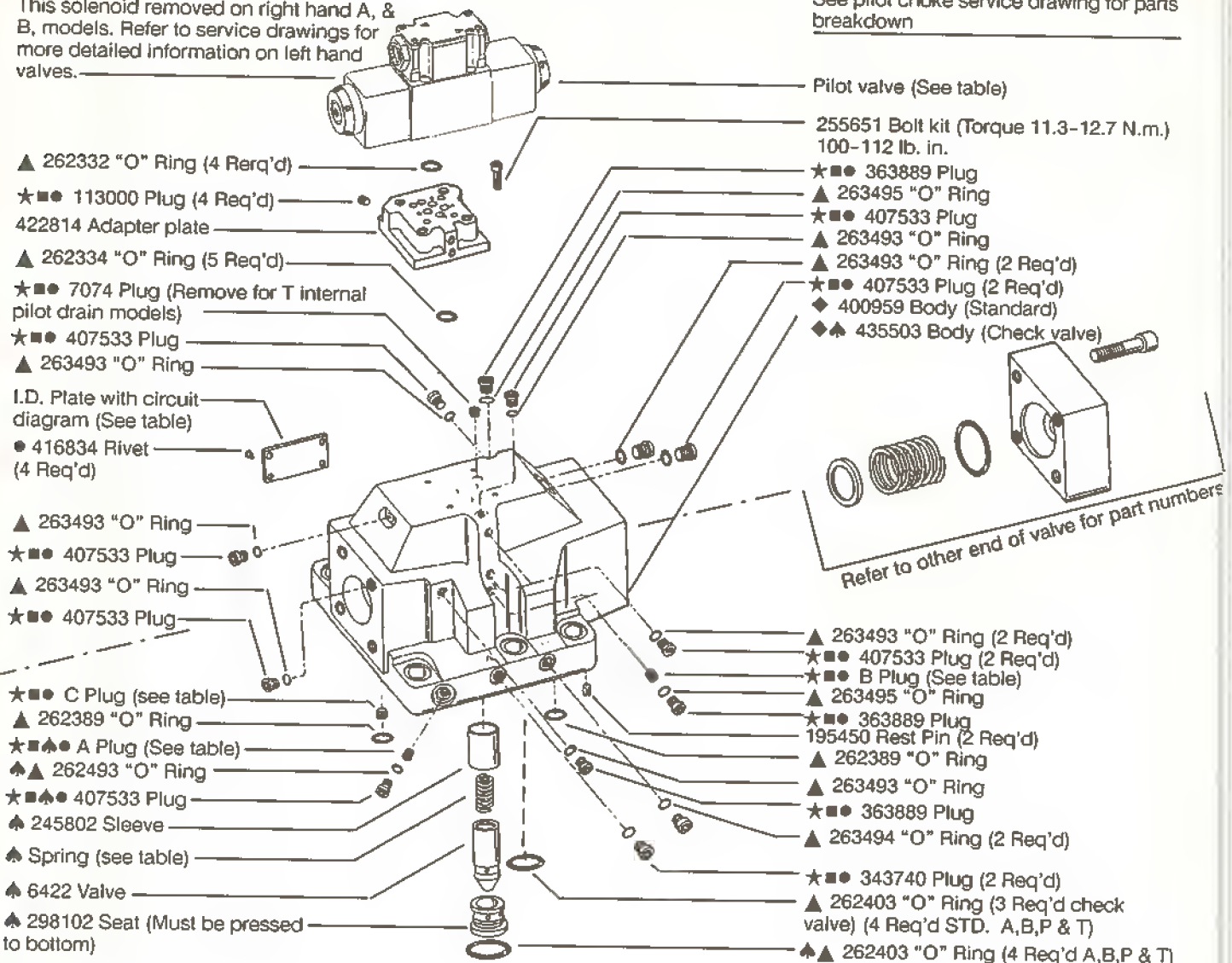
This solenoid removed on right hand A, & B, models. Refer to service drawings for more detailed information on left hand valves.

PILOT STAGE BOLT KIT (INCLUDES 4 ATTACHING BOLTS)

MODEL	BOLT KIT
W/O Pilot choke	696899
W/ Pilot choke	696900

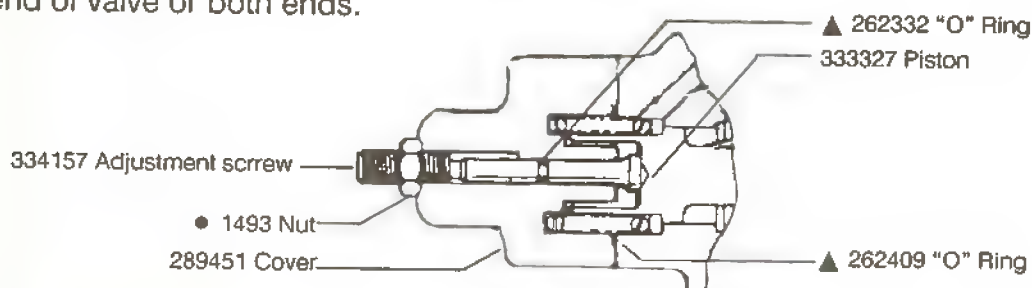
Torque 4.5-5.7 N. m. (40-50 lb. in.)

See pilot choke service drawing for parts breakdown



Stroke Adjustment Parts

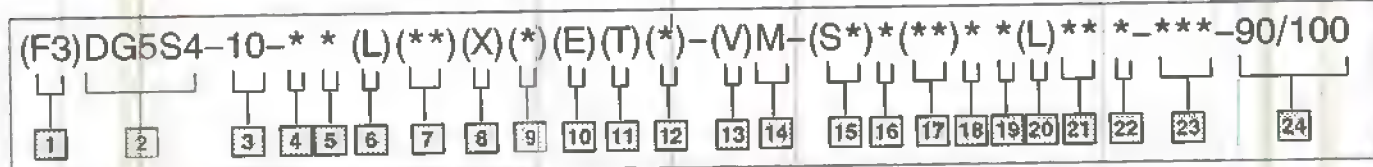
(Either end of valve or both ends.)



NOTE

For satisfactory service life of these components in industrial applications, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner.

Model Code



1 Seals for mineral oil & fire resistant fluids

2 Directional control valve
Manifold or subplate mounted
Solenoid controlled
Pilot operated, Sliding spool
4 way flow direction

3 Interface (Valve size 1-1/4 inch)
10 - NFPA-D10 (ISO-4401-10)

4 Spool type (see table)

5 Spool/Spring arrangement
A - Spring offset, to CYL. A
B - Spring centered, sol. A removed
C - Spring centered
F - Spring offset, to CYL. A shift to center
N - No spring detented

6 Left hand
L - Left hand (single solenoid only)
Blank - Omit when not required

7 Manual override option
Blank - Plain override solenoid ends only
H - Waterproof override solenoid ends only
H2 - Waterproof override both ends of single solenoid
P2 - Plain override both ends of single solenoid
Y - Lockable manual overrides solenoid ends only/DC only
Z - No overrides in either end

8 Response type
X - Fast response
Blank - Standard low shock models

9 Spool control modifications

1 - Stroke adjustment
2 - Pilot choke adjustment
3 - Pilot choke & stroke adjustment
7 - Stroke adjustment CYL. A only
8 - Stroke adjustment CYL. B only
2-7 - Dual pilot choke & stroke ADJ. A port end only
2-8 - Dual pilot choke & stroke ADJ. B port end only
Blank - Omit when not required

10 Pilot pressure

E - External pilot pressure
Omit - Internal pilot pressure

11 Pilot drain

T - Internal pilot Drain
Omit - External pilot drain

12 Pressure port check valve

K - 0.35 bar (5 psi) cracking pressure
R - 3.45 bar (50 psi) cracking pressure
S - 5.20 bar (75 psi) cracking pressure
Blank - Omit when not required

13 Solenoid energization identity

Blank - Standard arrangement for ANSI B93.9 (energise solenoid A for flow P to A port)
V - Solenoid identification determined by position of solenoid. (Solenoid A at port A end and/or solenoid B at port B end. (All 4 & 8 spools are always V code)

14 Flag symbol heading electrical options & features

15 Spool indicator switch
Available on high performance models, DG4V-3, only.
Omit when not required.

S1 - Options available on U only)
S2 - Options available on U only)
S3 - Options available on P* only
S4 - Options available on P* only
S5 - Options available on FW/FJ only

16 Coil type

U - ISO 4400
F - Flying lead
SP1 - Single 6,3 MM spade to IEC 760
SP2 - Dual 6,3 MM spade to IEC 760

17 Electrical connections (F type coil only) omit if not required

T - Wired terminal block
PA - Instaplug male receptacle only
PB - Instaplug male & female receptacle
PA3 - Three pin connector
PA5 - Five pin connector

18 Housing (F type coils only)

W - 1/2 NPT thread wiring housing
J - 20 mm thread wiring housing

19 Electrical options

1 - ISO with fitted plug, U type coils only
6 - ISO with fitted plug, & lights
U type coils only

20 Solenoid indicator lights (F build only) used with T terminal block models. (Omit if not required)

21 Coil identification

22 Pilot valve code (tank pressure rating)

2 - 10 bar (145 psi) DG4V3-60
5 - 100 bar (1450 psi) DG4V3S-60
6 - 160 bar (2285 psi) DG4V3-60
7 - 210 bar (3000 psi) DG4V3-60

23 Pilot valve port orifices

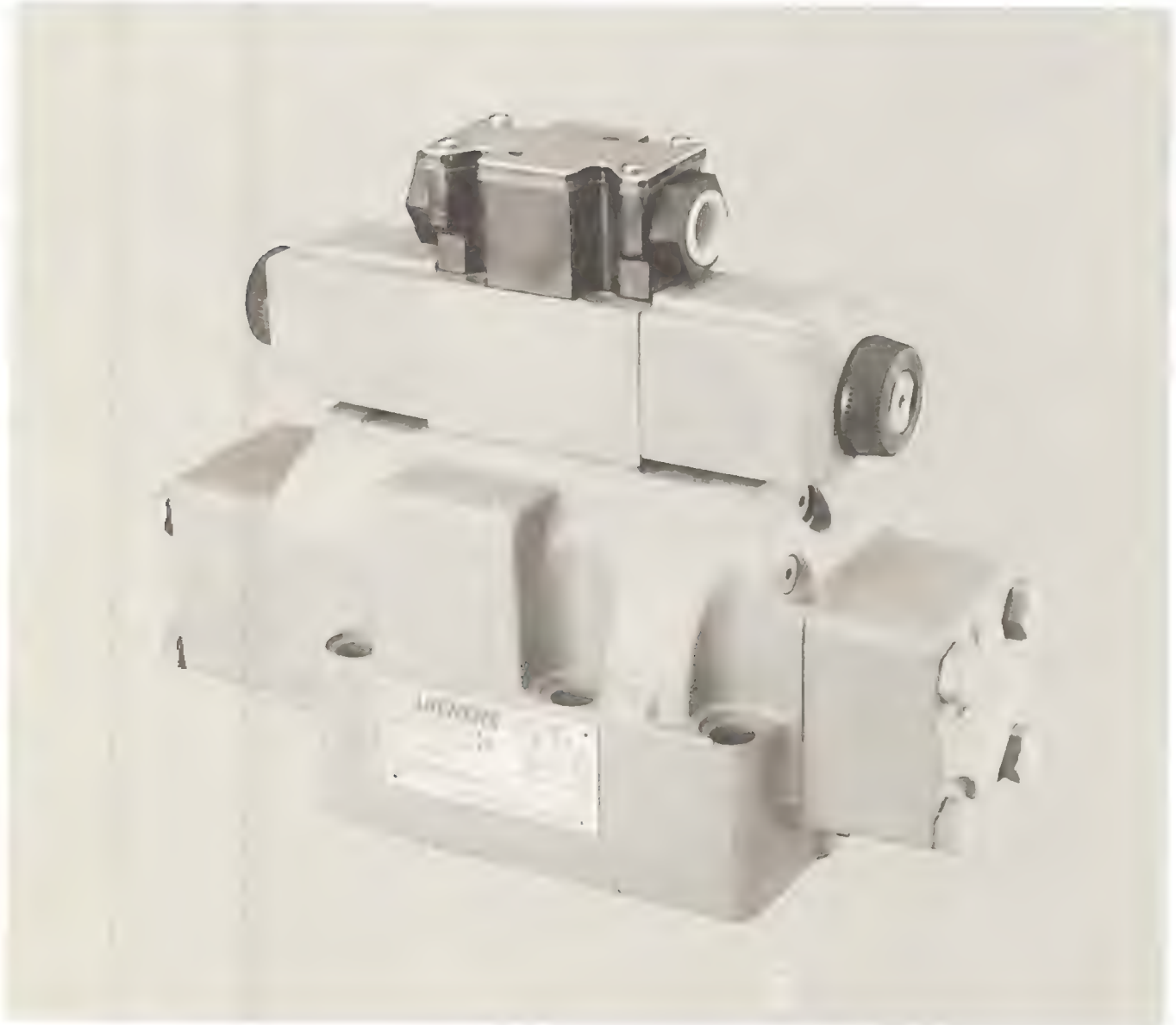
24 Design

90 - DG4V3S-60 pilot valve
100 - DG4V3-60 pilot valve

6 Thru **23** included in pilot valve model code

Solenoid Controlled Pilot Operated Directional Valve

DG5S-8-*D(L)-(*) (X)-(*)-(E)-(T)(*)-(V)M-(S*)-*(**)**(L)-***-***-30/40



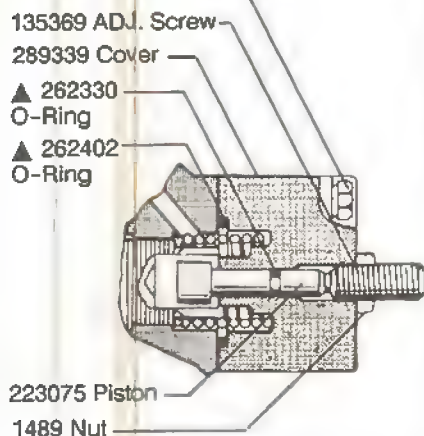
Vickers Incorporated
A TRINOVA Company
5445 Corporate Drive
P. O. Box 302
Troy, Michigan 48007-0302
U.S.A.

Released 05-01-91

I-3888-S

Parts shown included in stroke ADJ. kit 941154. Stroke ADJ. CYL. "B" end only.

470843 Screw (4 Req'd)
Torque 49-59 N.m.
(36-44 lb. ft.)



■ PLUG	TORQUES (OILED)	
	N.m.	lb. in.
113000	5.0-5.9	45-52
237588		
343740	15.0-16.0	133-142
398071	9.8-10.2	87-90
407533	12.1-12.4	107-110

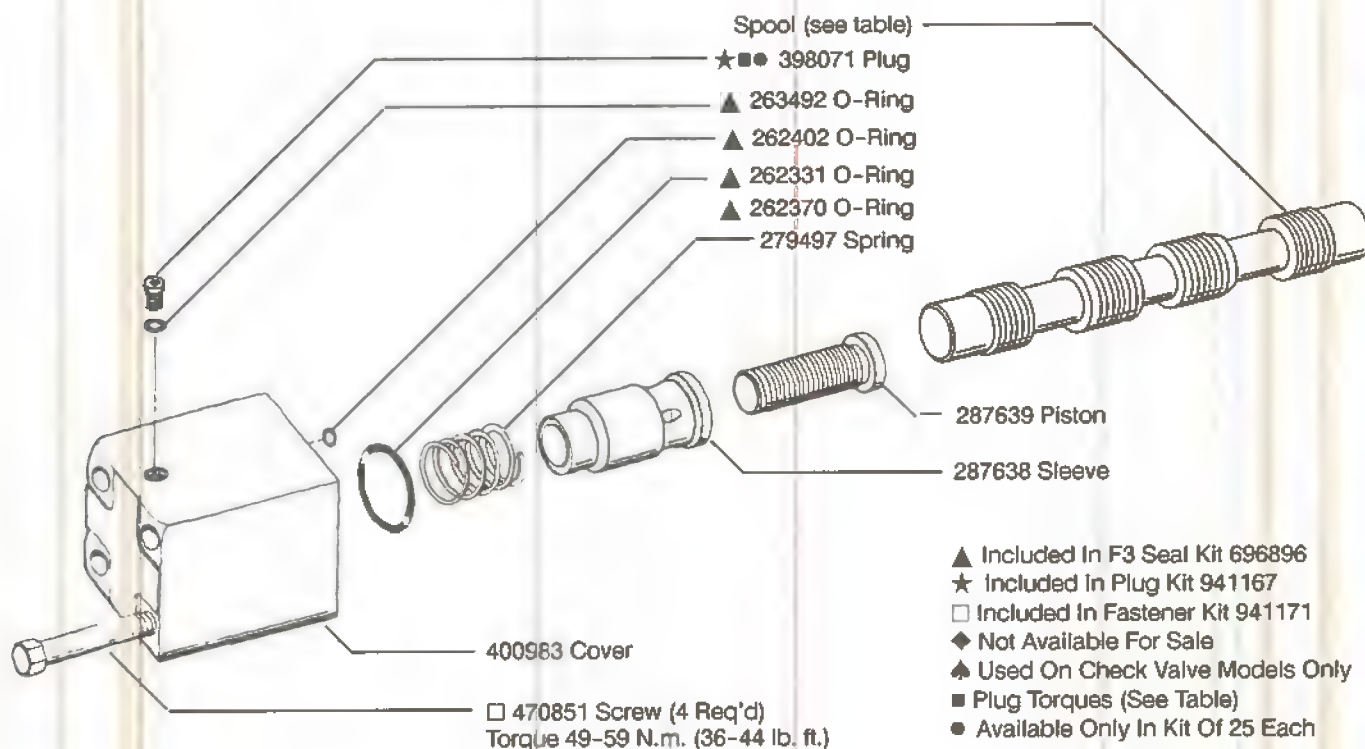
VALVE MODEL CODE	MAIN STAGE SPOOL TYPE	PILOT VALVE MODEL CODE
DG5S-8-*D-30	0, 1, 2, 3, 6, 9, 11, 31, 33	DG4V-3S-7C-60
DG5S-8-*D-40		DG4V-3-7C-60
DG5S-8-*D-30	4 & 8	DG4V-3S-78C-60
DG5S-8-*D-40		DG4V-3S-78C-60

See pilot valve service drawing for parts breakdown

MAIN STAGE SPOOL TYPE	SPOOL	ID PLATE
DG5S-8-OD	363495	400967
DG5S-8-1D	*276623	400968
DG5S-8-2D	363496	400969
DG5S-8-3D	*276625	400970
DG5S-8-4D	276626	400971
DG5S-8-6D	363498	400972
DG5S-8-8D	363499	400971
DG5S-8-9D	363500	400967
DG5S-8-11D	*276623	573685
DG5S-8-31D	*276625	573685
DG5S-8-33D	363501	400972

*** SPOOL ASSEMBLY NOTE**

Assemble type 1 & 3 spools with narrow center land toward "A" end of valve.
"A" end is defined as being closest to CYL. port "A". Type 11 & 31 spools are installed in reverse of type 1 & 3 with narrow center lands toward "B" end of valve.



- ▲ Included In F3 Seal Kit 696896
- ★ Included In Plug Kit 941167
- Included In Fastener Kit 941171
- ◆ Not Available For Sale
- ♣ Used On Check Valve Models Only
- Plug Torques (See Table)
- Available Only In Kit Of 25 Each

PILOT STAGE BOLT KIT (INCLUDES 4 ATTACHING BOLTS)

MODEL	BOLT KIT
W/O Pilot choke	696892
W/ Pilot choke	696893

Torque 4.5-5.7 N. m. (39.8-50.4 lb. in.)

See pilot choke service drawing for parts breakdown

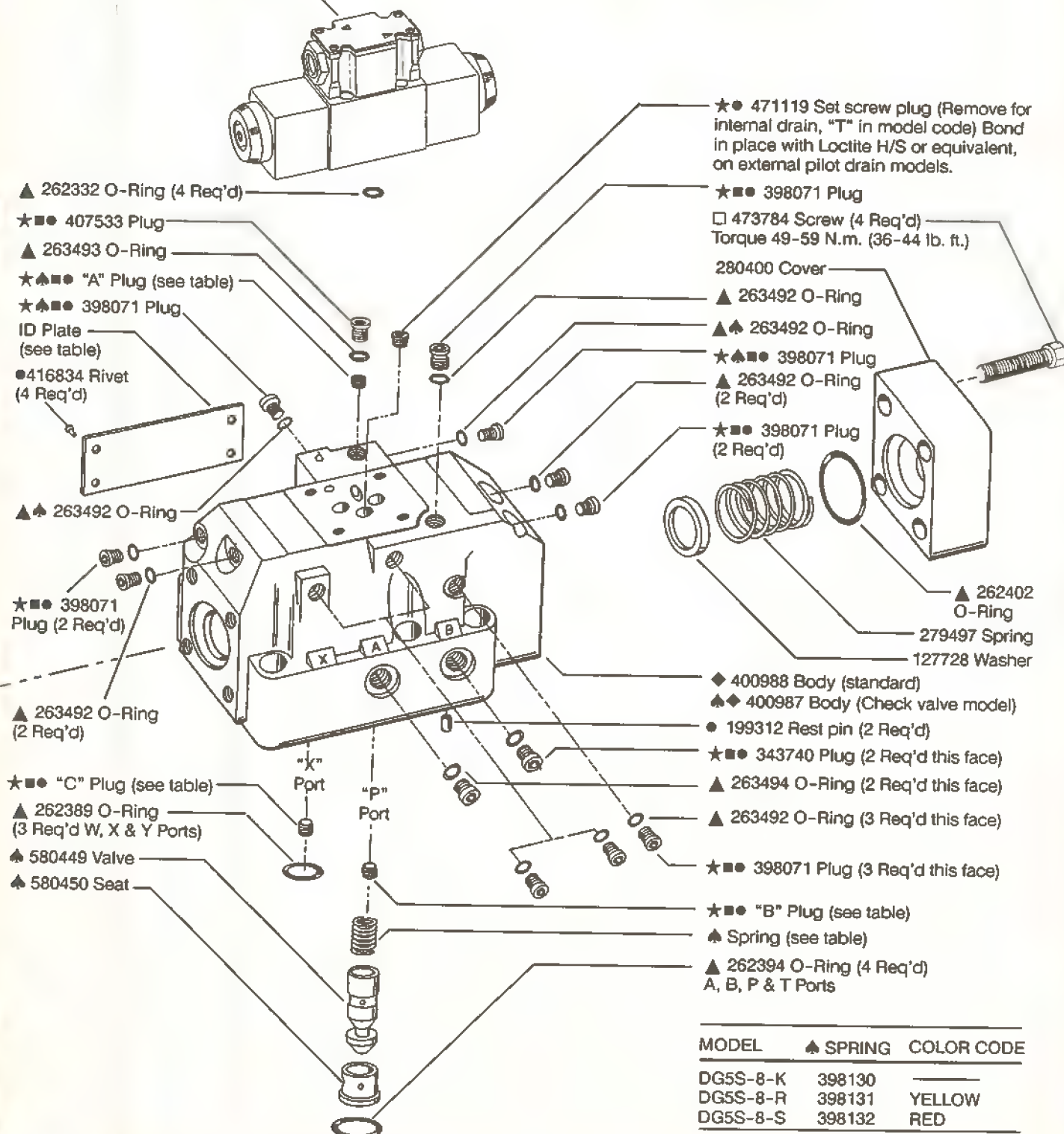
Pilot valve see table and refer to service drawing for more detailed information.

■ PLUG INSTALLATION TABLE

MODEL	"A" PLUG	"B" PLUG	"C" PLUG
DG5S-8-*D-**	DOES NOT EXIST	237588	—
DG5S-8-*D-***-E		113000	237588
DG5S-8-*D-***-X		—	—
DG5S-8-*D-***-X-E	—	113000	—
DG5S-8-*D-***-KRS	237588	DOES NOT EXIST	—
DG5S-8-*D-***-E-KRS	113000		237588
DG5S-8-*D-***-X-KRS	—		—
DG5S-8-*D-***-X-E-KRS	113000	—	—

113000 Solid plug

237588 Orifice plug



Model Code

(F3)		DG5S		-8-		*	D		(L)		(*)		(X)		-(*)		-(E)		-(T)		(*)		-(V)		M		-(S*)		*(**)		*		*		(L)		**		5		***		-30/40																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																												
└─┬─┘		└─┬─┘		└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	└─┬─┘	

1 Seals for mineral oil & fire resistant fluids

2 Directional control valve
Manifold or subplate mounted
Solenoid controlled
Pilot operated
Rated pressure 210 Bar (3000 psi)

3 Interface

8 - NFPA-D06 (ISO-4401-08)

4 Spool type (see table)

5 Spool/Spring arrangement

D - Pressure centered

6 Left hand

L - Left hand (single solenoid only)
Blank - Omit when not required

7 Manual override option

Blank - Plain override solenoid ends only
H - Waterproof override solenoid ends only
H2 - Waterproof override both ends of single solenoid
P2 - Plain override both ends of single solenoid
Y - Lockable manual overrides solenoid ends only/DC only
Z - No overrides in either end

8 Response type

X - Fast response
Blank - Standard low shock models

9 Spool control modifications

2 - Pilot choke adjustment
8 - Stroke adjustment CYL. B only
2-8 - Dual pilot choke & stroke ADJ. B port end only
Blank - Omit when not required

10 Pilot pressure

E - External pilot pressure
Omit - Internal pilot pressure

11 Pilot drain

T - Internal pilot Drain
Omit - External pilot drain

12 Pressure port check valve

K - 0.35 bar (5 psi) cracking pressure
R - 3.45 bar (50 psi) cracking pressure
S - 5.20 bar (75 psi) cracking pressure
Blank - Omit when not required

13 Solenoid energization identity

Blank - Standard arrangement for ANSI B93.9 (energise solenoid A for flow P to A port)
V - Solenoid identification determined by position of solenoid. (Solenoid A at port A end and/or solenoid B at port B end. (All 4 & 8 spools are always V code)

14 Flag symbol heading electrical options & features

15 Spool Indicator switch
Available on high performance models, DG4V-3, only.
Omit when not required.

S1 - Options available on U only)
S2 - Options available on U only)
S3 - Options available on P* only
S4 - Options available on P* only
S5 - Options available on FW/FJ only

16 Coil type

U - ISO 4400
F - Flying lead
SP1 - Single 6.3 MM spade to IEC 760
SP2 - Dual 6.3 MM spade to IEC 760

17 Electrical connections (F type coil only) omit if not required

T - Wired terminal block
PA - Instaplug male receptacle only
PB - Instaplug male & female receptacle
PA3 - Three pin connector
PA5 - Five pin connector

18 Housing (F type coils only)

W - 1/2 NPT thread wiring housing
J - 20 mm thread wiring housing

19 Electrical options

1 - ISO with fitted plug, U type coils only
6 - ISO with fitted plug, & lights
U type coils only

20 Solenoid indicator lights (F build only) used with T terminal block models. (Omit if not required)

21 Coil identification

22 Pilot valve code (tank pressure rating)

2 - 10 bar (145 psi) DG4V3-60
5 - 100 bar (1450 psi) DG4V3S-60
6 - 160 bar (2285 psi) DG4V3-60
7 - 210 bar (3000 psi) DG4V3-60

23 Pilot valve port orifices

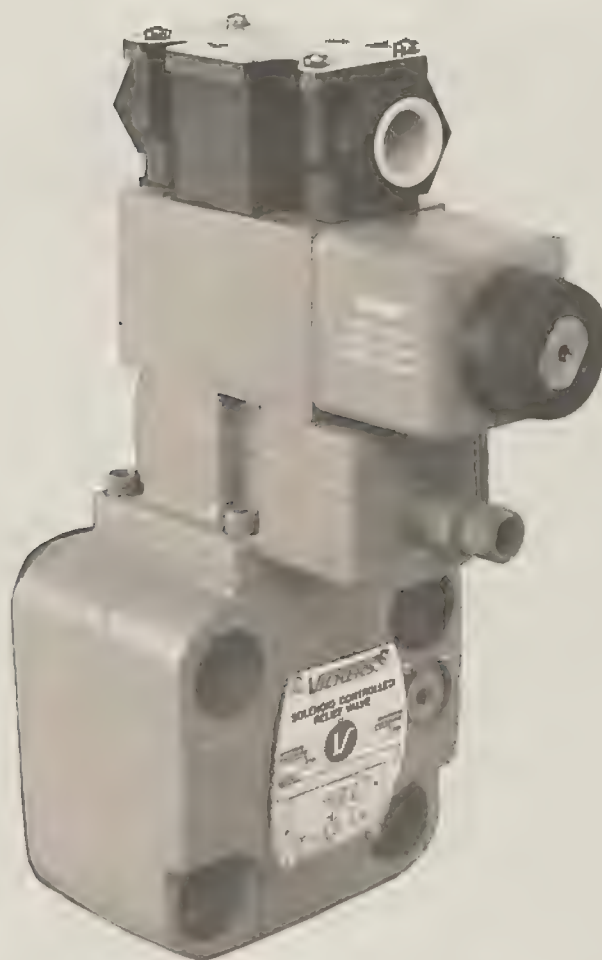
24 Design

30 - DG4V3S-60 pilot valve
40 - DG4V3-60 pilot valve

6 Thru **23** included in pilot valve model code

Solenoid Controlled Pilot Operated Relief Valves

(F3)-C/G/S/T5-(H)-03/06***(V)**(V)-M-(S*)***** (L)*****-100/110-EN**



Vickers Incorporated
A TRINOVA Company
5445 Corporate Drive
P. O. Box 302
Troy, Michigan 48007-0302
U.S.A.

*** NOTE**

On CG5-(H)0***C-*(V)-100/110 dual solenoid models, pilot valve & cover S/A are rotated 90° clockwise from body. Refer to pilot valve drawing for parts breakdown.

* Pilot Valve (See Table)
(DG4V-3(S)-*C-60 Shown)

▲ 232332 'O'Ring (4 Req'd)

▲ 263497 'O'Ring

■ 329463 Plug
Torque 53-58 N.m.
(39-43 lb. ft.)

■ 285601 Seat

Assemble 285601 seat with cross hole facing up as shown.

▲ 262361 'O'Ring

Inner Spring (See Table)

Outer Spring (See Table)

343154 Piston

Seat (See Table)

Sleeve ('H' High Flow Models Only)
(See Table)

696892 Bolt Kit (Includes 4 Bolts)
Torque 5.6 N.m. (50 lb. in.) Maximum

68905 Washer (4 Req'd)

1031 Screw (4 Req'd)
Torque 14.5-20.4 N.m. (11-15 lb. ft.)

■ Cover (See Table)

■ 343704 Plug &
▲ 263494 'O'Ring (See Table)

■ 398071 Plug &
▲ 263492 'O'Ring (See Table)

⊕◆ 292230 Screw

■ 326317 Shim
(As req'd to obtain
proper adj. range)

■ 1485 Locknut

⊕◆ 283949 Retainer

■ 64520 Washer

■ 283948 Plunger

▲ 262332 'O'Ring

■ Washer (See Table)

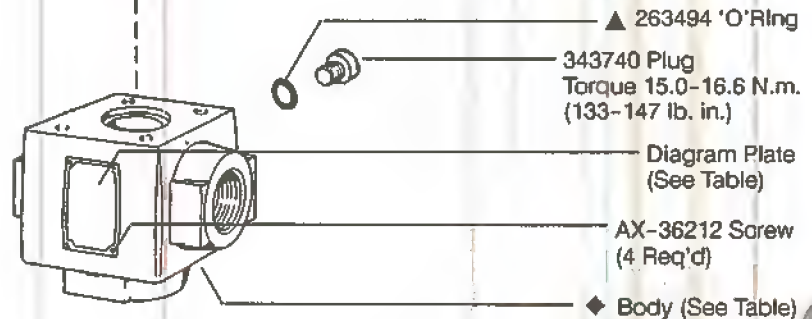
■ 422849 Spacer

■ Cover Spring
(See Table)

■ 290057 Piston

MODEL	SEAT	SLEEVE
C*5-03/06	343153	—
C*5-H06	589473	589472

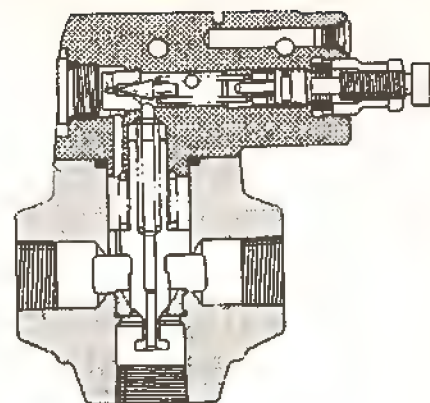
MODEL	■ COVER S/A
C*5-(H)0*0A/F-B(V)-100/110	942432
C*5-(H)0*0A/F-C(V)-100/110	942433
C*5-(H)0*0A/F-F(V)-100/110	942434
C*5-(H)0*1A-B(V)-100/110	942435
C*5-(H)0*2A-B(V)-100/110	
C*5-(H)0**C-B(V)-100/110	942436
C*5-(H)0*1A-C(V)-100/110	
C*5-(H)0*2A-C(V)-100/110	942437
C*5-(H)0**C-C(V)-100/110	
C*5-(H)0*1A-F(V)-100/110	
C*5-(H)0*2A-F(V)-100/110	
C*5-(H)0**C-F(V)-100/110	



MODEL	◆ BODY
CS5-03**-*-100/110	590407
CS5-(H)06**-*(V)-100/110	581701
CT5-06**-*-100/110	590348

MODEL	DIAGRAM PLATE	* PILOT VALVE
C*5 -(H)0*0A(P)-*(V)-M-***-100	422864	DG4V-3S-0BL-M***-60
C*5 -(H)0*0A(P)-*(V)-M-***-110		DG4V-3-0BL-M***-60
C*5 -(H)0*1A(P)-*(V)-M-***-100	422865	DG4V-3S-2AL-M***-60
C*5 -(H)0*1A(P)-*(V)-M-***-110		DG4V-3-2AL-M***-60
C*5 -(H)0*2A(P)-*(V)-M-***-100	423814	DG4V-3S-2BL-M***-60
C*5 -(H)0*2A(P)-*(V)-M-***-110		DG4V-3-2BL-M***-60
C*5 -(H)0*0C-*(V)-M-***-100	422862	DG4V-3S-0C-M***-60
C*5 -(H)0*0C-*(V)-M-***-110		DG4V-3-0C-M***-60
C*5 -(H)0*2C-*(V)-M-***-100	422863	DG4V-3S-2C-M***-60
C*5 -(H)0*2C-*(V)-M-***-110		DG4V-3-2C-M***-60
C*5 -(H)0*0F(P)-*(V)-M-***-100	477211	DG4V-3S-0FL-M***-60
C*5 -(H)0*0F(P)-*(V)-M-***-110		DG4V-3-0FL-M***-60

* Refer to pilot valve drawing for parts breakdown.



Relief valve sectional view without pilot valve

MODEL	■ COVER	■ PLUG/'O'RING (2 REQ'D)	■ PLUG/'O'RING
C*5-(H)0*0A-100/110	422828	—	—
C*5-(H)0*1A-100/110	424203	343740/▲ 263494	398071/▲ 263492
C*5-(H)0*2A-100/110			
C*5-(H)0**C-100/110			

MODEL	■ WASHER	INNER SPRING	OUTER SPRING	■ COVER SPRING
C*5-0***-B-100/110	—	2077	—	2280
C*5-H0***-BV-100/110		—	184458	
C*5-0***-C-100/110	233110	2077	—	583937
C*5-H0***-CV-100/110		—	184458	
C*5-0***-F-100/110	—	2077	—	2281
C*5-H0***-FV-100/110		—	184458	

■ Included In Cover S/A

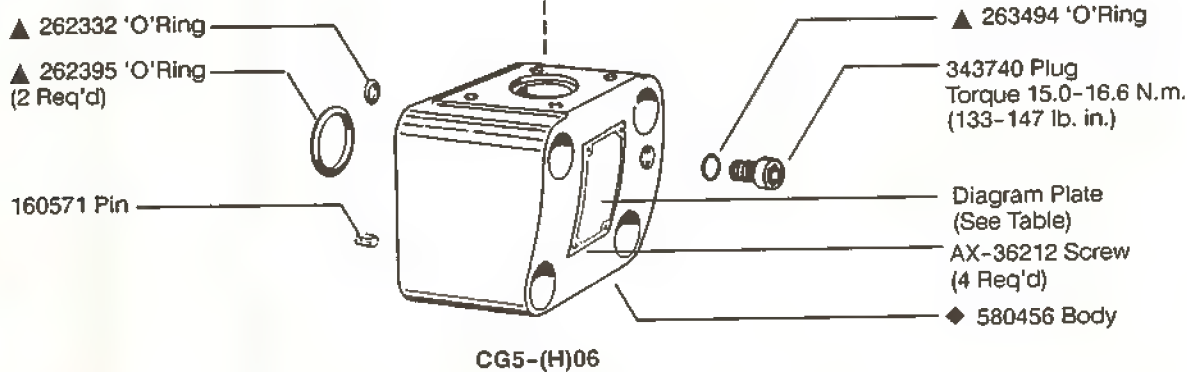
⊕ Lubricate With Oil Before Assembly

▲ Included In F3 Seal Kit 696929
(includes pilot valve seals)

◆ Not Available For Sale

NOTE

Parts Prefixed With A Symbol Available
Only In Kits.



Model Code

(F3)	-	C	*	5	-(H)	*	*	*	*	-	(V)	*	*	(V)	-	M	-(S*)	-	*	*	*	*	(L)	-	*	*	*	*	*	-	100/110	-	EN	*	*
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24												

1 Seals for mineral oil & fire resistant fluids

2 Relief valve

3 Connections

G - Subplate mounting
S - Straight threads
T - NPTF threads

4 Solenoid controlled

5 High flow
Omit for standard models

6 Valve size

03 - 3/8"-.8750 straight thread
06 - 3/4"-1.0625 straight thread
or 3/4" NPTF

7 Pilot spool function

0, 1, or 2 Indicates venting condition

8 Pilot spool spring arrangement

A - Spring offset
C - Spring centered
F - Spring centered, shift to center

9 Pressure range

B - 125-1000 psi
C - 500-2000 psi
F - 1500-3000 psi

10 High vent (Req'd for high flow models)

Blank - Omit for low vent models

11 Manual override options (included in pilot valve model code)

Blank - Plain override solenoid ends only
H - Waterproof override solenoid ends only
H2 - Waterproof override both ends of single solenoid
M - Serviceable manual overrides in solenoid ends only
P2 - Plain override both ends of single solenoid
Y - Lockable manual overrides solenoid ends only
Z - No overrides in either end

12 Solenoid energization identity

Blank - Standard arrangement for ANSI B93.9 (energise solenoid A for flow P to A port)
V - Solenoid identification determined by position of solenoid. (Solenoid A at port A end and/or solenoid B at port B end. (All 4 & 8 spools are always V code)

13 Flag symbol heading electrical options & features

14 Spool position monitoring switch (tank pressure rating 10 bar only)

S1 - Switch, normally open, U coils only
S2 - Switch, normally closed, U coils only
S3 - Switch, wired normally open, P*
S4 - Switch, wired normally closed, P*
S5 - Switch, free leads, FW & FJ only

15 Coil type

U - ISO 4400
F - Flying lead
SP1 - Single 6,3 series spade to IEC 760
SP2 - Dual 6,3 series spade to IEC 760

16 Electrical connections (F type coil only) omit if not required

T - Wired terminal block
PA - Instaplug male receptacle only
PB - Instaplug male & female receptacle
PA3 - Three pin connector
PA5 - Five pin connector

17 Housing (F type coils only)

W - 1/2 NPT thread wiring housing
J - 20 mm thread wiring housing

18 Electrical options

1 - ISO with fitted plug, U type coils only
6 - ISO with fitted plug, with lights, U type coils only

19 Solenoid indicator lights (F build only) To be used with T terminal block models. (Omit if not required)

20 Coil identification

21 Pilot valve code (tank pressure rating)

2 - 10 bar (145 psi) use with switch models S*
5 - 100 bar (1450 psi) DG4V-3S-60
6 - 160 bar (2300 psi) DG4V-3-60
7 - 210 bar (3000 psi) DG4V-3-60

22 Pilot valve port orifices

23 Design

100 - DG4V3S-60
Standard pilot valve
110 - DG4V3-60
High performance pilot valve

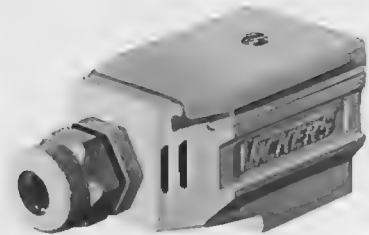
24 Special modifications (omit if not required)

11 Thru **22** included in pilot valve model code

Power plugs for proportional valves

EHH-AMP-702-D-10

EHH-AMP-702-E-10



1. General description

These plugs, conforming to ISO 4400/ DIN 43650 interface, offer a low-cost control solution for direct solenoid-operated, non-feedback, hydraulic proportional valves through the use of an integral amplifier.

Adjustments of "gain", "ramp time" and "deadband" can be made directly at the plug. Two ranges of ramp times are offered:

- model type D, 10-600 ms.
- model type E, 0,5-5s.

The proportional plug is controlled with a 0-10V command signal to give maximum currents, adjustable with the "gain" control, between 0,5A and 1,8A.

2. Features and benefits

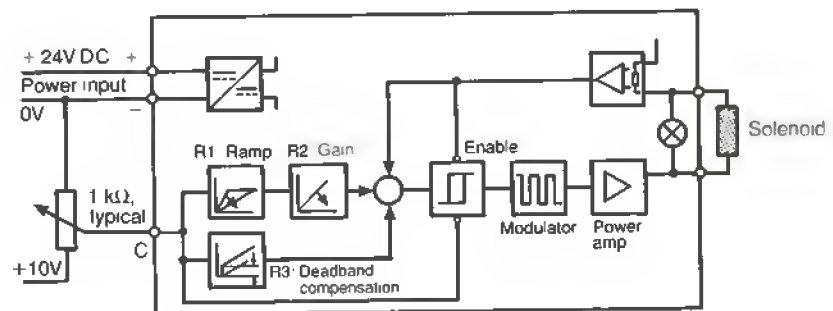
- Integral amplifier provides essential functions for control of proportional valves
- Adjustable ramp time
- Adjustable deadband compensation
- Adjustable gain
- Ease of installation, with reduced cost
- Reduction of EMI radiation
- Fully short-circuit and reverse-polarity protected

3. Application

Primary applications are in the control of directly operated, non-feedback proportional valves where the cost of more sophisticated electronic controls can be avoided.

The combination of proportional valve and plug offers very low cost solutions to many hydraulic actuator control problems requiring smooth acceleration and deceleration.

Electrical block function diagram



4. Model code

EHH-AMP-702- * - 1*

1 2

1 Adjustment range

D = Proportional plug: 10 ms to 600 ms
E = Proportional plug: 0,5s to 5s

2 Design number, 10 series

Subject to change: installation dimensions unaltered for design numbers 10 to 19 inclusive.

5. Operating data

5.1 Electrical

Power supply	20-28V DC: incl. $\pm 10\%$ max. ripple peak-to-peak
Protection	IEC 529: IP65 (when correctly installed with interface seal in place) Fully short-circuit and reverse-polarity protected
Isolation to VDE 0110	Group "B"
Output current: rated cut-off short-circuit	1,6A 3A 0,1A rms typical
Output voltage	Typically 0,55V below input voltage
Max. load impedance at 20V supply voltage	19 ohms (1,0A) 12 ohms (1,6A) 9 ohms (2,0A)
Command signal: for no output for output	0 to 100 mV 200 mV to 10V
Input impedance (signal)	2700 ohms
PWM frequency	400 Hz typical
Ramp time: model type D model type E	10 ms to 600 ms 0,5s to 5s
Gain	0,05 A/V to 0,18 A/V
Deadband compensation	0 to 1A

5.2 Mechanical

Housing	PA6 glass reinforced plastic (conforming to UL-94HB) Color: gray
Mounting interface	ISO 4400 (DIN 43650)
Cable clamp	Pg9 screw type
Cable diameter	Ø5 to 10 mm (0.197 to 0.394" dia)
Wire section	0,5 to 1,0 mm ² (0.001-0.002 in ²) (20AWG-18AWG)
Temperature, ambient range	-20 to +70° C (-4 to +158° F)
Mass	0,07 kg (0.154 lb)

5.3 Functions

- Ramp

Ramp time is adjustable by potentiometer R1.

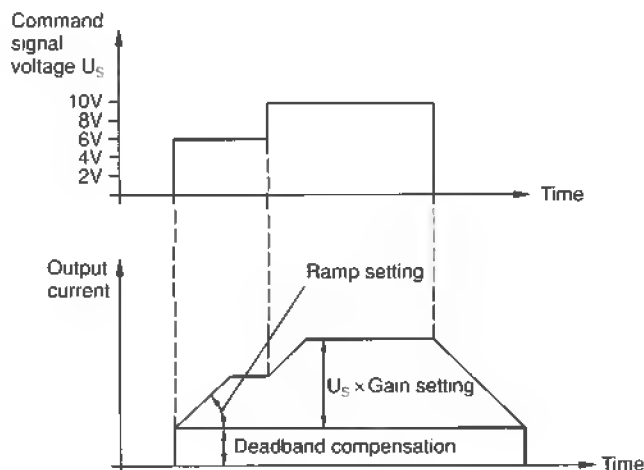
- Gain

Amplifier gain is adjustable by potentiometer R2.

- Deadband compensation

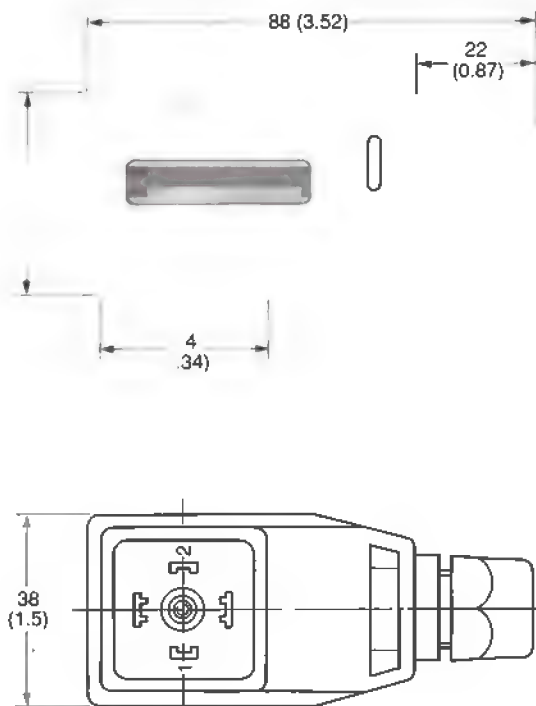
Deadband compensation is adjustable by potentiometer R3, and is switched on at triggering voltage of 200 mV.

Input/output characteristics



6. Installation dimensions in mm (inches)

3rd angle projection



7. Installation data

Commissioning (start-up) procedure

1. Correctly wire the plug and, before mounting it on the valve solenoid, apply 24V DC (20 to 28V limits) to the "power input" terminal.
2. Check for correct plug function by illumination/non-illumination of the LED: The LED should illuminate when the voltage applied to the "signal input" terminal is more than 100 mV, (max. 10V) and should not be illuminated when the applied voltage is less than 100 mV.

If there is a malfunction a new plug must be fitted.

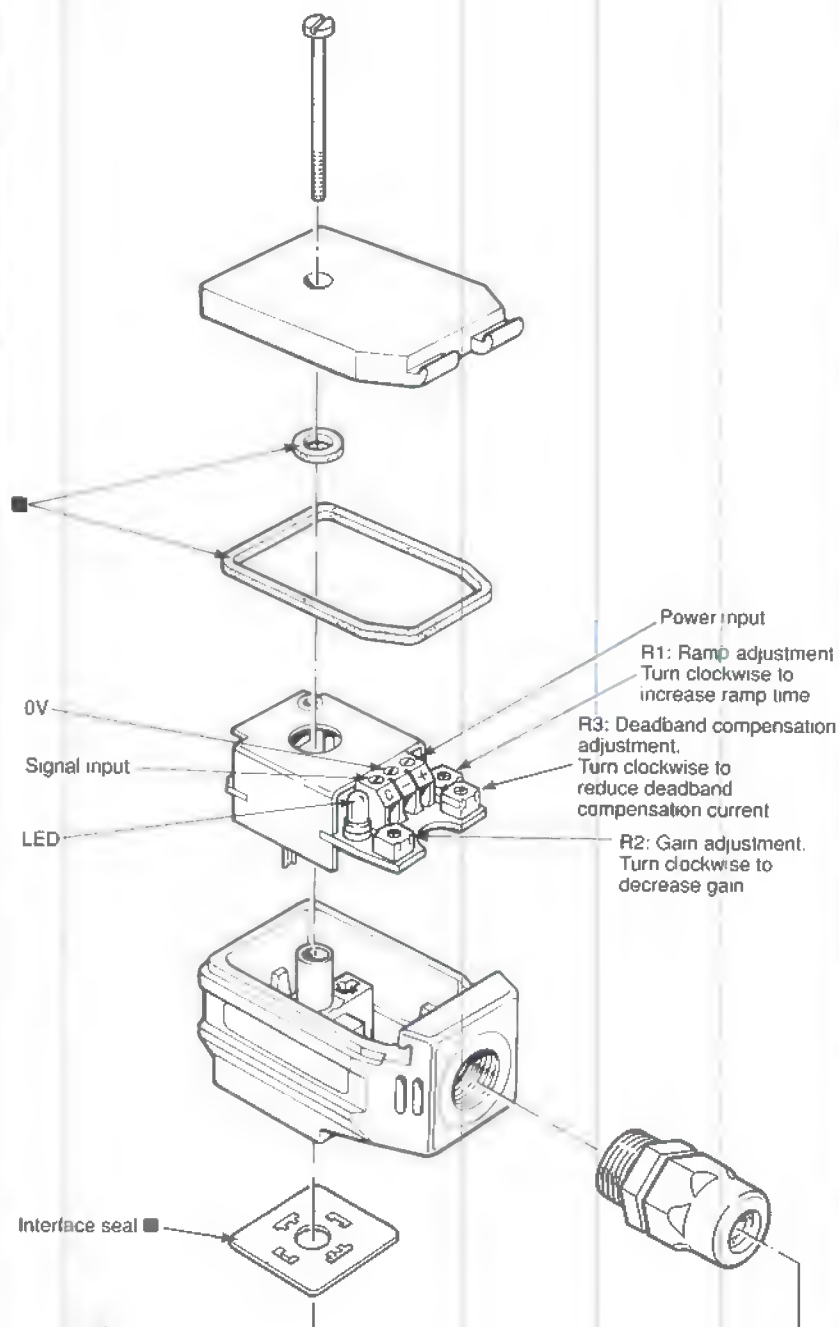
3. Switch off power supply and command/input signal and then install plug on solenoid. Ensure that all seals are fitted correctly and clamped as the retaining bolt is tightened: *this is essential in providing IP65 protection.*

4. *Ensure that the hydraulic system will not cause any unsafe movement of actuators, then:*
 - Switch on power supply again.
 - Repeat LED/function check as in 2.

An LED malfunction now indicates a short circuit at the load.

5. Successful completion of these checks means that the plug and load are ready for use.

Assembly showing wiring connection points, LED and adjustment potentiometers

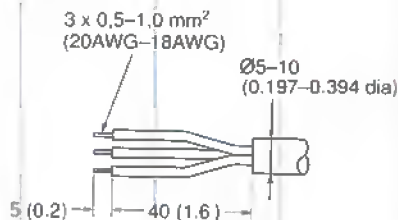


Warnings

- Ensure cable clamp nut is adequately tightened to secure the cable
- Do not install, or remove, the plug when power is on
- Do not connect, or disconnect, the wiring while power is on

- All seals must be fitted correctly at plug installation to provide protection to IP65 (IEC 529)

Wiring preparation



8. Spare parts

The only spare part available is the interface seal, part number 732100.

9. Ordering procedure

Order plug by full model code, and spare interface seals by part number 732100.

Presented by:

VICKERS
A TRINOVIA Company

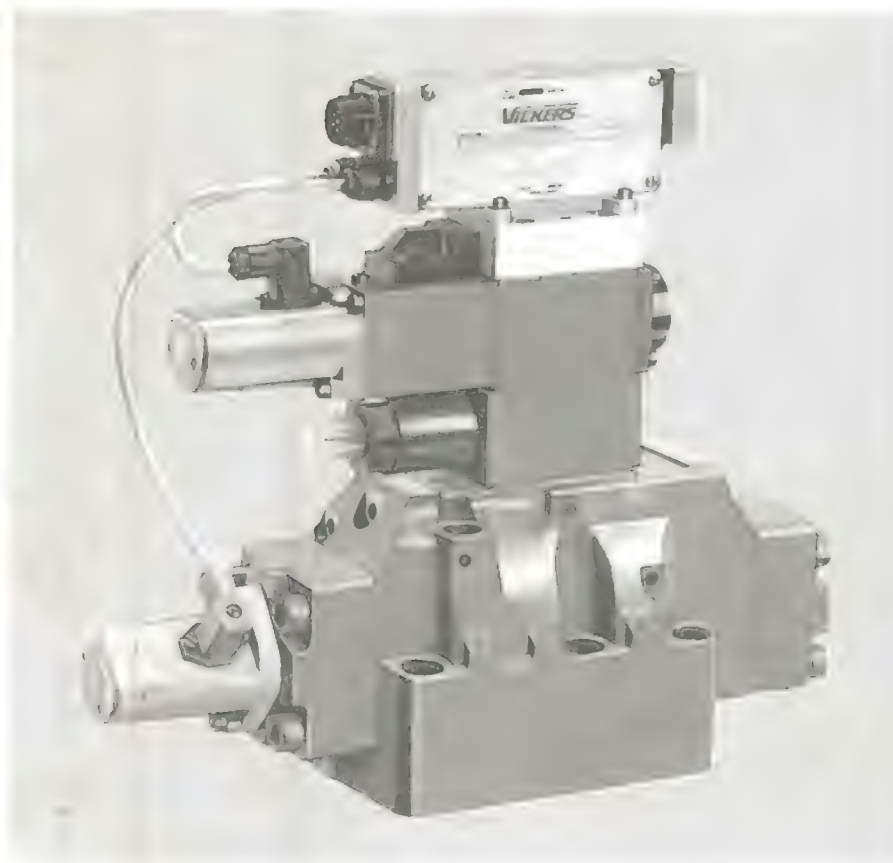
Proportional Directional Valves with Integral Electronics

KAD/TG4V-3/5, 20/30 series

KAFD/TG4V-3/5, 20 series

KASDG4V-3, 10 series

KAF/HDG5V-5/7/8, 10/20 series



Introduction

The hydraulic performance of the valves in this range of integrated assemblies is identical to that shown in Vickers "Proportional Valves" catalog GB-C-2007B. All options shown in GB-C-2007B (e.g. spool type and flow rating, etc.) are applicable to these valves, the only exceptions being changes to electrical features.

The reader should refer to GB-C-2007B for all hydraulic performance data and valve selection.

1. General Description

A range of proportional directional and throttle valves with control amplifiers built directly on, and pre-wired to, the valves. Factory-set adjustments of gain, balancing deadband and dither ensure high repeatability valve to valve.

The only electrical inputs required are power supply (24V or 12V DC according to model type) and a voltage command signal of $\pm 10V$. The amplifier is housed in a robust metal enclosure, sealed against ingress from spray and splashing of water and other fluids. Electrical connections are via a standard 7-pin plug.

Two LEDs give status of "Power on" (green) and LVDT failure indication (red). A monitor point allows the function of the amplifier to be checked. Ramp functions, if required, must be generated externally.

Vickers offers a range of auxiliary rail-mounting electronic control modules ideally suited for signal processing, e.g. ramp functions, converter, etc. See catalogs GB-C-2164/2174/2175 for details.

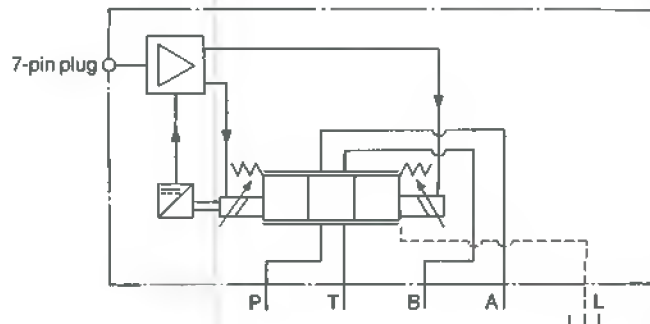
2. Features and Benefits

- Factory-sealed adjustments increase valve-to-valve accuracy, and simplify system set-up
- Valve and amplifier selected, ordered, delivered and installed as a performance-tested package
- Standard 24V DC supply with wide tolerance band
- Non-feedback models available for 12V DC
- Standard $\pm 10V$ DC command signals
- Installation wiring reduced and simplified
- Standard 7-pin connector plug
- LED status indication and monitor point help trouble shooting
- Simple valve removal and replacement
- Vibration and shock tested
- Supported by auxiliary function modules

3. Functional Symbols

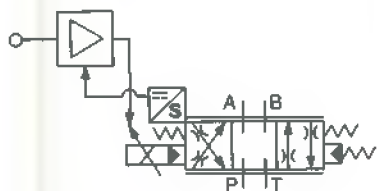
Refer to GB-C-2007B for all available valve and spool symbols.

Single-stage valves
KAFDG4V-3 example

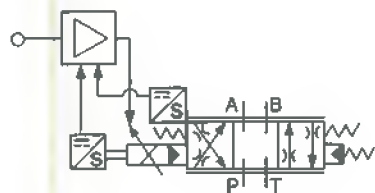


2-stage valves
Simplified symbols

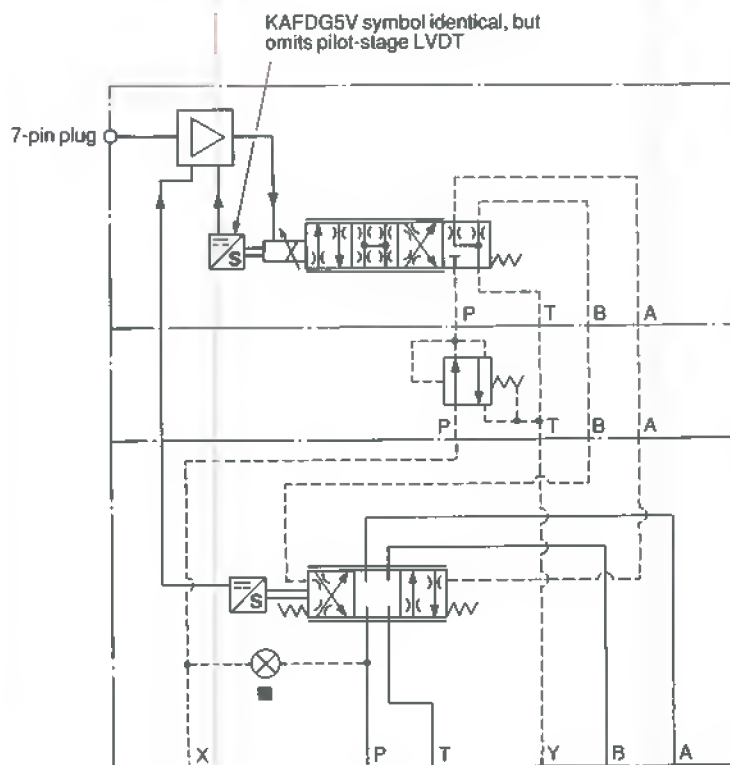
KAFDG5V models



KAHDG5V models



Detailed symbol, KAHDG5V example



■ Internal plug shown, for external pilot supply; omit plug for internal pilot supply. See "Application note B" and [5] in model code in catalog GB-C-2007B.

4. Model Codes

Model codes used to identify proportional valves with integral amplifiers are based on model codes of the basic valves (as found in catalog GB-C-2007B), with differences to show:

- The “integrated amplifier” series.
- New plug and electrical definitions.

Model codes listed below refer to GB-C-2007B for the basic valve options, [1], [2], [3], etc. The following new features are referenced by letters, [a], [b], etc.

[a] Series type designator

A = Integrated amplifier

[b] Solenoid connection type

F = Flying lead

[c] Electrical connection

PD7 = 7-pin electrical plug

[d] Power supply voltage

G = 12V DC (10 to 20V DC) ▲

H = 24V DC (18 to 36V DC)

▲ Available only on valves without feedback, i.e. KADG4V-3 & 5 and KATG4V-3 & 5

Single-stage directional valves, without feedback

Reference basic valve type: KDG4V-3 & 5

Model code with integrated amplifier

1
2
3
4
5
7
8
K A DG4V- * - ** C *** - * -(V) **M F PD7-** * * - **
a
b
c
d

Single-stage throttle valves, without feedback

Reference basic valve type: KTG4V-3 & 5

Model code with integrated amplifier

1
2
3
4
5
7
K A TG4V- * - ** B *** - * -(V) **M F PD7-** * 7 - **
a
b
c
d

Single-stage directional valves, with feedback

Reference basic valve type: KFDG4V-3 & 5

Model code with integrated amplifier

1
2
3
4
5
6
K A FDG4V- * - ** C *** -Z-(V) **M F PD7-H** * - **
a
b
c
d

Single-stage throttle valves, with feedback

Reference basic valve type: KFTG4V-3 & 5

Model code with integrated amplifier

1
2
3
4
5
6
K A FTG4V- * - ** C *** -Z-(V) **M F PD7-H** * - **
a
b
c
d

Single-stage valve for closed loop applications

Reference basic valve type: KSDG4V-3

Model code with integrated amplifier

1
2
3
4
K A SDG4V-3- * * L- ** **M F PD7-H** 7 - **
a
b
c
d

Two-stage directional valves, with feedback

Reference basic valve type: KF/HDG5V-5, 7 & 8

Model code with integrated amplifier

1
2
3
4
5
6
K A F/H DG5V- * - ** C *****-(E)X-VM **F PD7-H** 1 - **
a
b
c
d

5. Operating Data

For all other applicable valve operating data, refer to GB-C-2007B.

Power supply:		
Models with feedback		24V DC (18V to 36V including 10% peak-to-peak max. ripple)
Models without feedback		24V DC (as above) or 12V DC (10 to 20V including ripple), according to model type
Command signal		0 to +10V DC, or 0 to -10V DC, or -10V to +10V DC
7-pin plug connector		
Pin connections:	A	Power supply +ve
	B	Power 0V
	C	Signal 0V
	D	+ve voltage demand signal
	E	-ve voltage demand signal
	F	Monitor output
	G	Protective ground
Gain adjustment ▲		25 to 125%
Zero adjustment ▲		±18%
Factory set adjustments		Deadband, gain, dither and offset
Monitor point signal:		
For KAD/TG4V-3 & 5 models		0,5V per amp solenoid current
For all other models		±10V for full stroke output stage spool
Power stage PWM frequency		2 kHz nominal
Temperature range:		
Full performance specification		0° to +50°C (+32° to 122°F)
Reduced performance specification ◆		-20° to 0°C (-4° to +32°F)
Storage		-25° to +85°C (-13° to 185°F)
Reproducibility, valve-to-valve (at factory settings):		
Flow gain @ 100% command signal		≤ 5%
Protection:		
Electrical		Reverse polarity protected
Mechanical		IEC 144 class IP65
Relative humidity		85 to 95% at 20° to 70°C (68° to 158°F)
Mass		Add 0,4 kg (0.9 lb) to mass for applicable valve

▲ "Adjust zero" applicable to KASDG*V model only. All other valves have gain adjustment which is accurately set at the factory. Altering this setting will affect valve to valve interchangeability.

◆ Valve will function with reduced dynamic response.

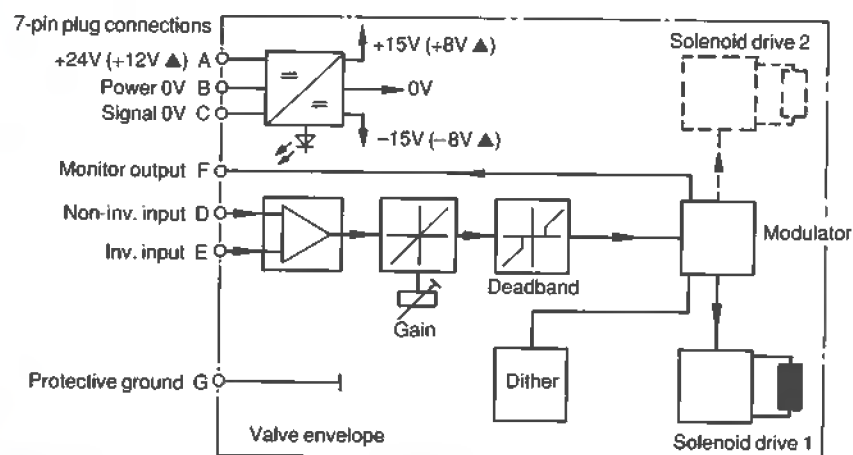
6. Performance Characteristics

Refer to GB-C-2007B for the following valve characteristics:

- Mounting interface specifications
- Max. pressures
- Coil electrical data
- Power capacity envelopes
- Flow gain
- Hysteresis
- Step input response
- Frequency response
- Fluid compatibility
- Filtration requirements

7. Electrical Block Diagrams

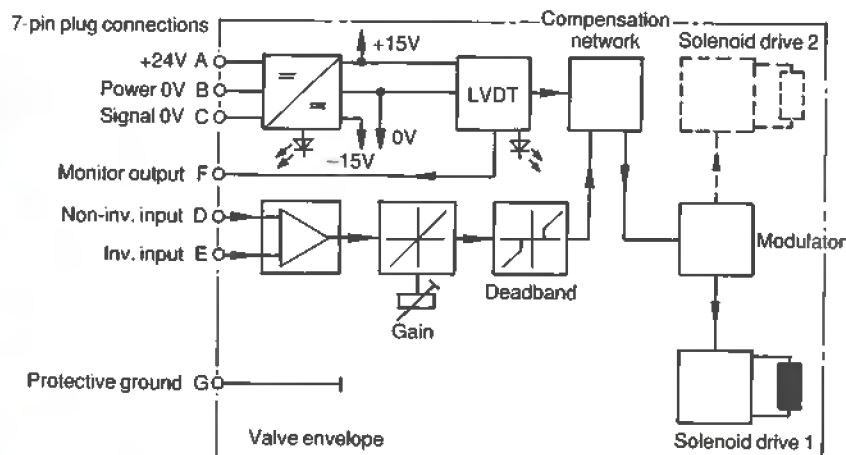
Single-stage valves without feedback KADG4V-3 and 5 KATG4V-3 and 5



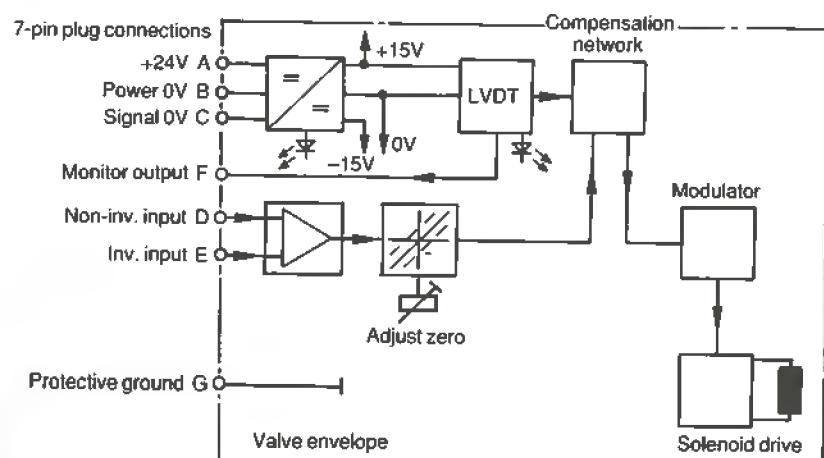
▲ Values for 12V models, "G" in model code [d]. All other values for 24V models.

Single-stage valves with feedback KAFDG4V-3 and 5 KAFTG4V-3 and 5

2-stage valves with feedback from main-stage only KAFDG5V-5, 7 and 8



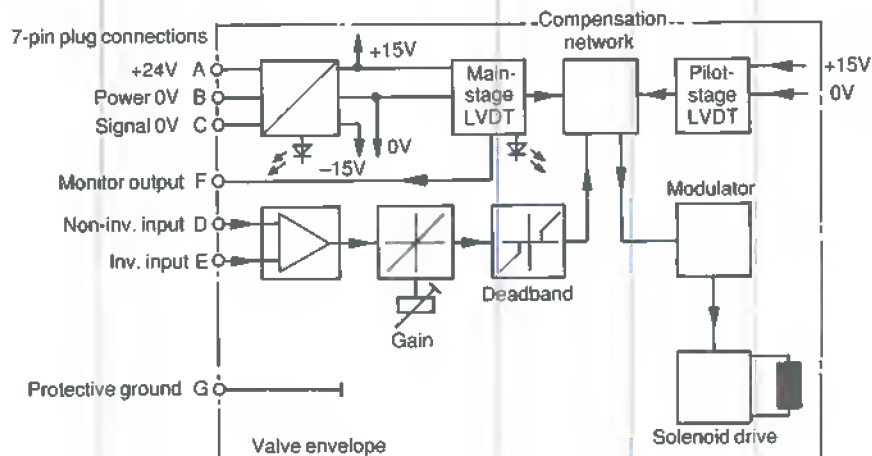
Single-stage valve for closed-loop applications KASDG4V-3



Command Signals and Outputs

Input	Pin ref.	Signal polarity	Valve flow
Non-inverting input	D	+	P-B
	D	-	P-A
Inverting input	E	+	P-A
	E	-	P-B
Differential input	D & E	D > E	P-B
		D < E	P-A

2-stage valves with feedback from pilot-stage and main-stage KAHDG5V-5, 7 and 8



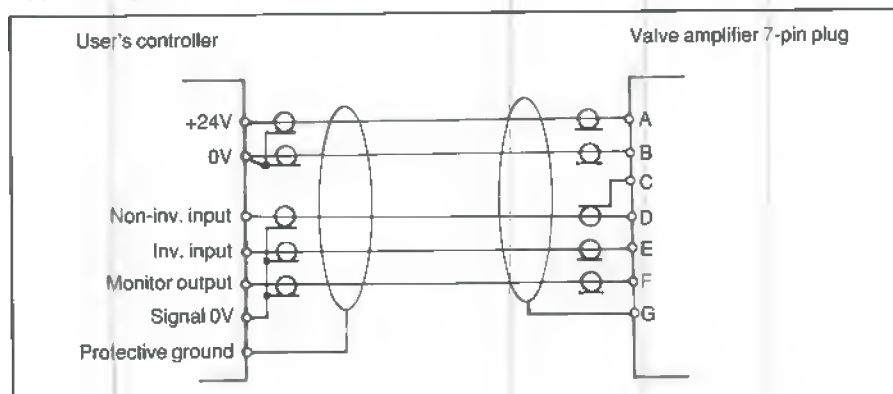
Wiring Size

Recommended wire sizes between the control system and the valve amplifier.

Power	16 x Ø 0,2 mm (16 x 0.008" dia) minimum; 3A
Signal	10 x Ø 0,1 mm (10 x 0.004" dia) minimum; 0,5A
Protective ground	Not less than as for power
Screen and shield	Each core should be screened and the cable shielded, especially on long cable runs.

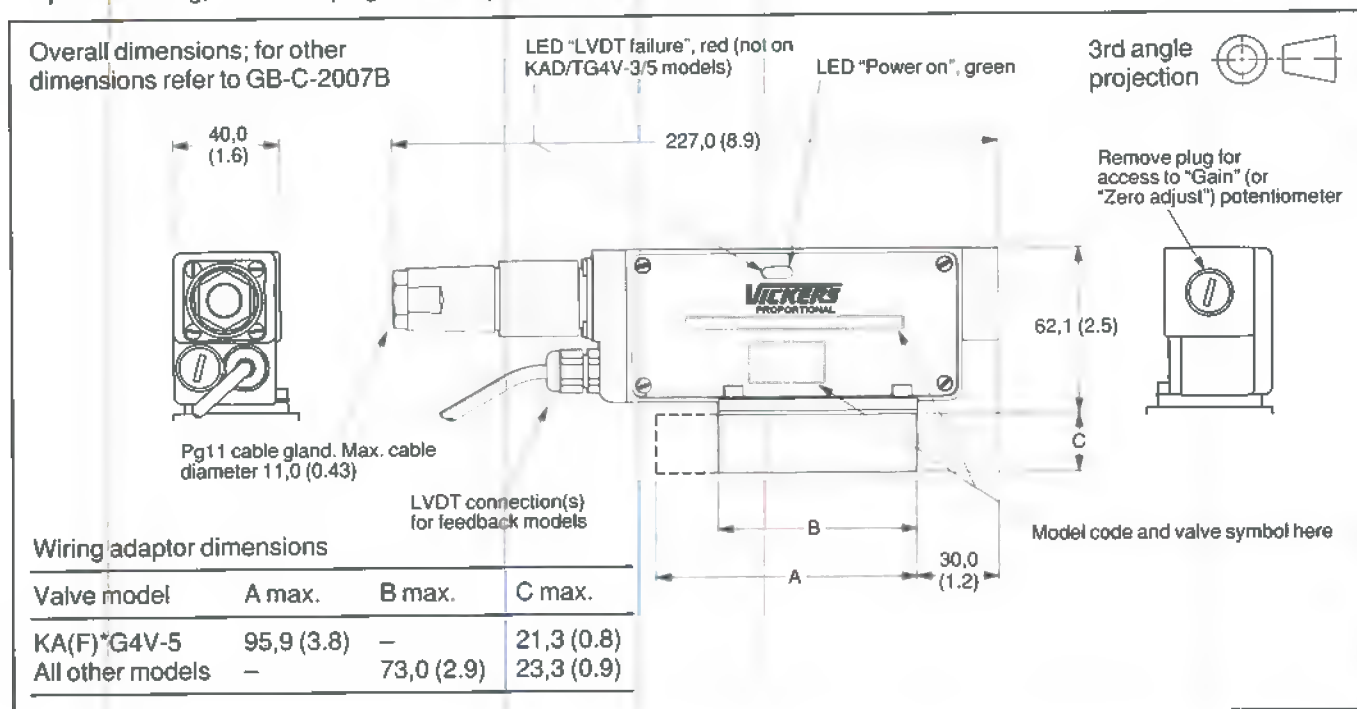
A suitable cable would be 5 cores of 16/0,2 mm (16/0.008") individually screened and with overall shield.

Typical Signal Arrangement

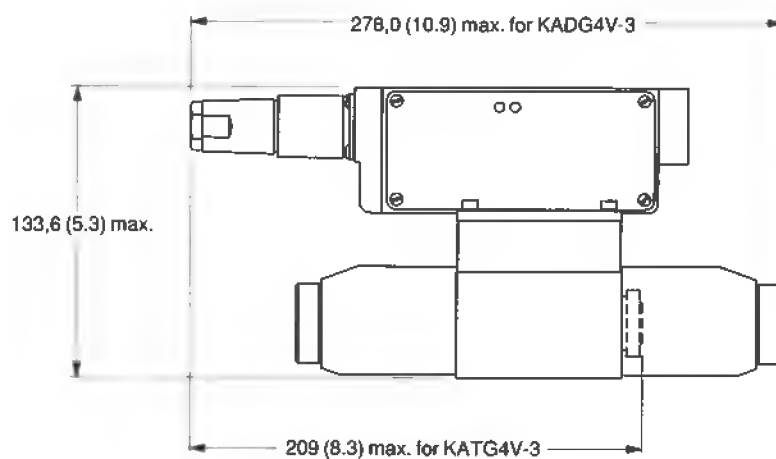


8. Installation Dimensions in mm (inches)

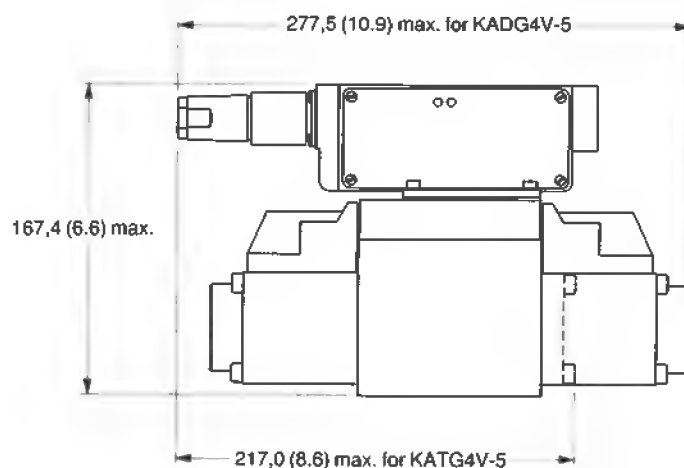
Amplifier housing, connector plug and wiring adaptor, all models



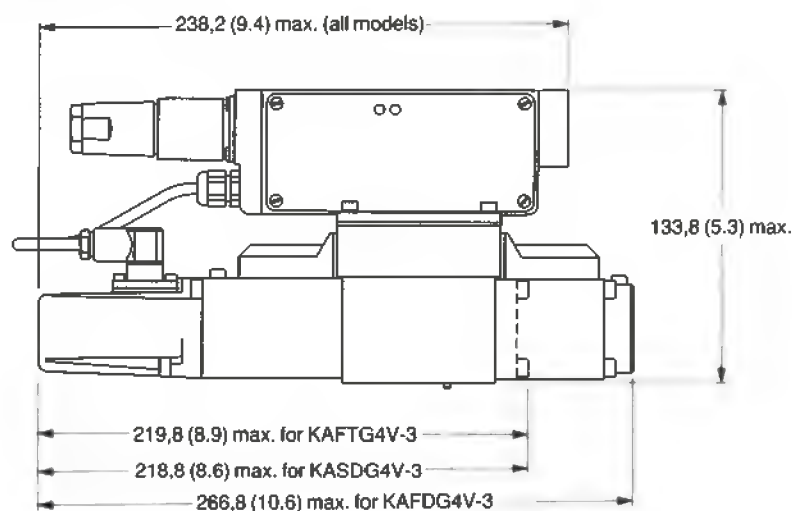
Single-stage, without feedback, size 3
KAD/TDG4V-3 models



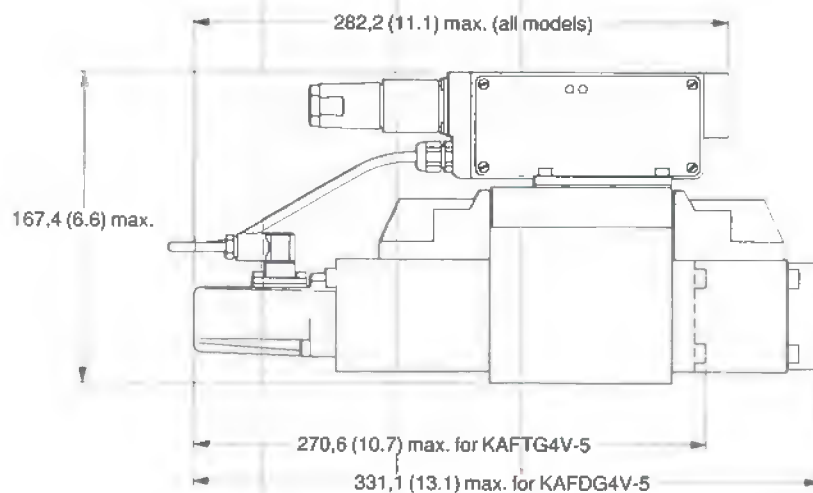
Single-stage, without feedback, size 5
KAD/TDG4V-5 models



Single-stage, with feedback, size 3
KAFD/TDG4V-3 and KASDG4V-3 models

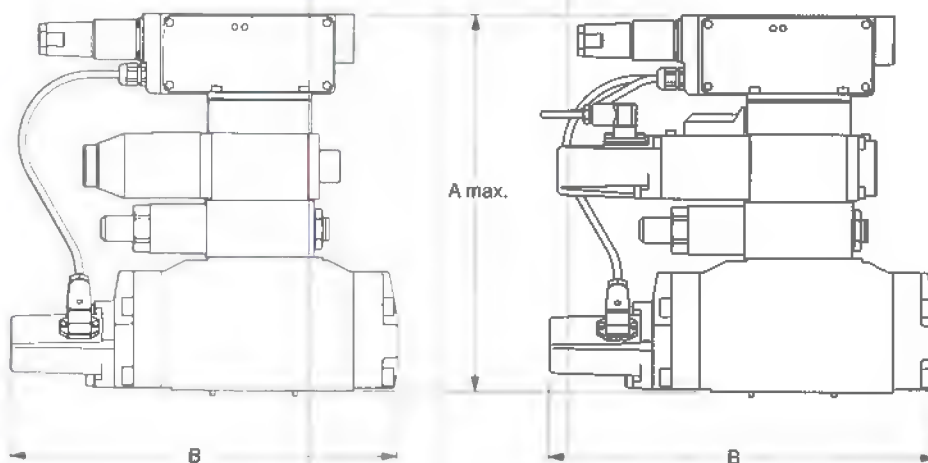


Single-stage, with feedback, size 5
KAFD/TDG4V-5 models



Two-stage models
KA4DG5V-5 models

KA4DG5V models



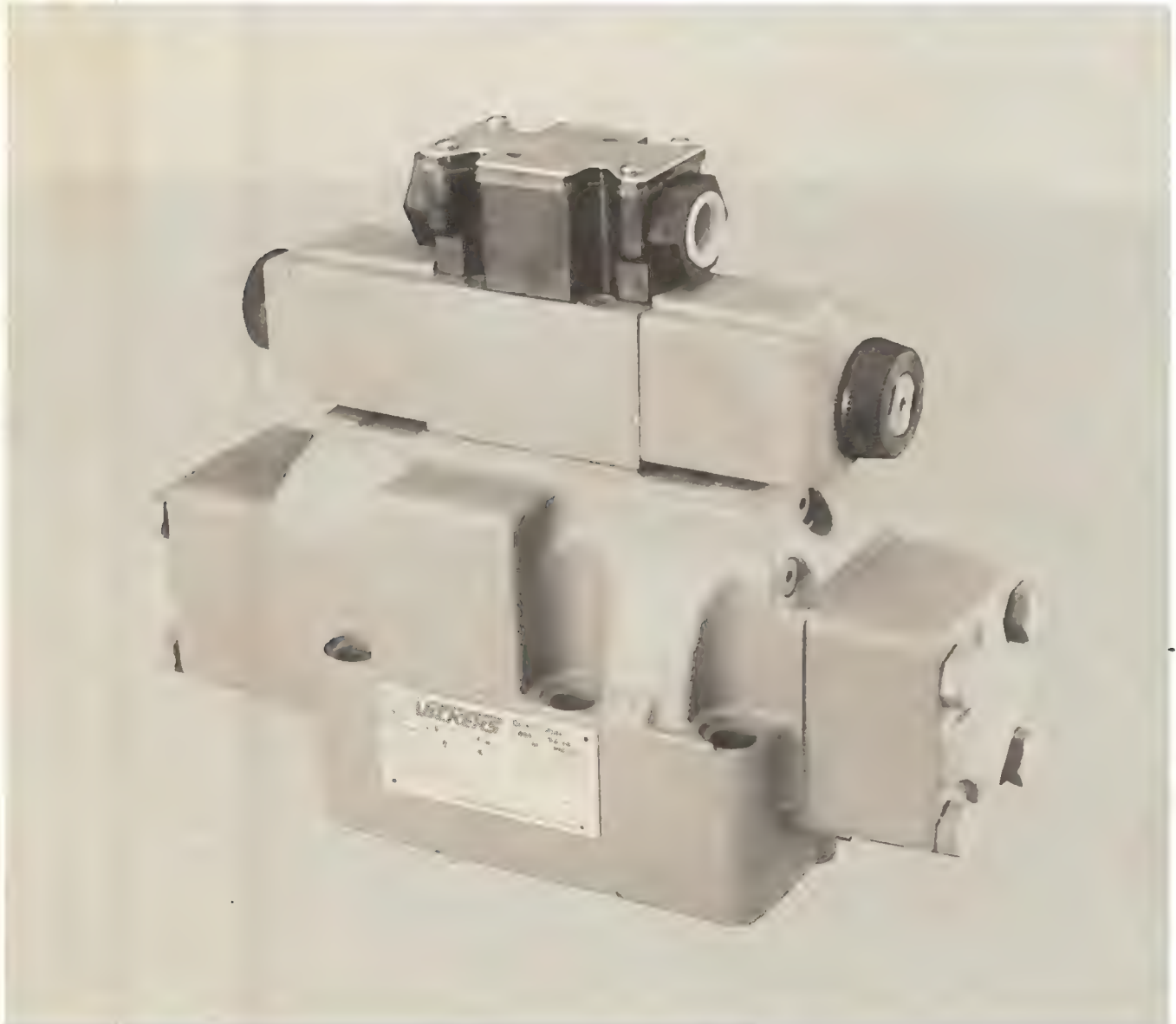
Dimension	Size 5	Size 7	Size 8
A	261,1 (10.3)	268,9 (10.6)	301,0 (11.9)
B	261,0 (10.28)	270,0 (10.63)	336,1 (13.24)

Presented by:

VICKERS
A TRINJOVA Company

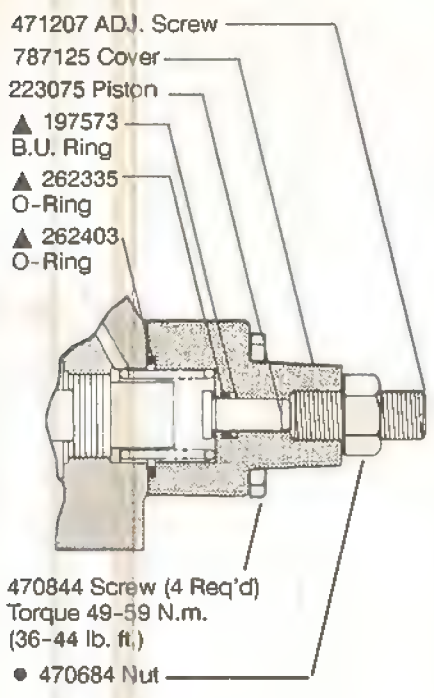
Solenoid Controlled Pilot Operated Directional Valve

DG5S-H8-**(L)-(*)-(X)-(*)-(E)-(T)(*)-(V)M-(S*)-*(**)**(L)-***-***-60/70



Vickers Incorporated
A TRINOVA Company
5445 Corporate Drive
P. O. Box 302
Troy, Michigan 48007-0302
U.S.A.

Parts shown included in stroke ADJ. kit 941156. Order two kits if stroke ADJ. is required both ends.



■ PLUG	TORQUES (OILED)	
	N.m.	lb. in.
113000	5.0-5.9	45-52
237588		
343740	15.0-16.0	133-142
398071	9.8-10.2	87-90
407533	12.1-12.4	107-110

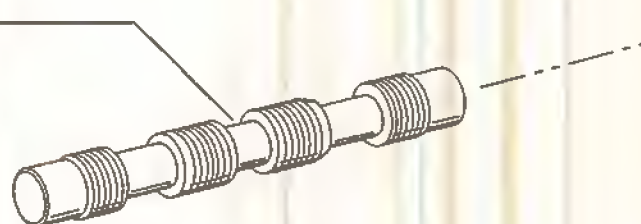
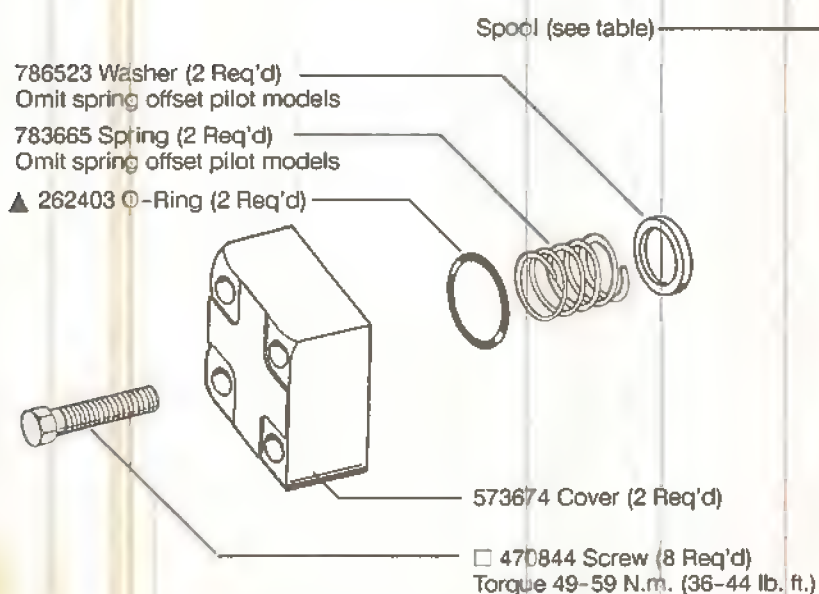
MAIN STAGE SPOOL TYPE	AVAILABLE VALVE TYPE	SPOOL	MAIN STAGE ID PLATE	
			"A" ONLY	B/C/F/N
0	A/B/C//N	786350	400975	400976
1		*786557		400977
2		786349		400978
3		*786558		400979
4		628162		400980
6		786559		400981
8		627221		400980
9		786561		400976
11		*786557		632700
31		*786558		580475
33		786562		400981

*** SPOOL ASSEMBLY NOTE**

Assemble type 1 & 3 spools with narrow center land toward "A" end of valve. "A" end is defined as being closest to CYL. port "A". Type 11 & 31 spools are installed in reverse of type 1 & 3 with narrow center lands toward "B" end of valve.

VALVE MODEL CODE	MAIN STAGE SPOOL TYPE	PILOT VALVE MODEL CODE
DG5S-H8-*A-60	0, 1, 2, 3, 6, 9, 11, 31, 33	DG4V-3S-2A-60
DG5S-H8-*A-70		DG4V-3-2A-60
DG5S-H8-*A-60		DG4V-3S-28A-60
DG5S-H8-*A-70	4 & 8	DG4V-3-28A-60
DG5S-H8-*B-60	0, 1, 2, 3, 6, 9, 11, 31, 33	DG4V-3S-6B-60
DG5S-H8-*B-70		DG4V-3-6B-60
DG5S-H8-*B-60		DG4V-3S-68B-60
DG5S-H8-*B-70	4 & 8	DG4V-3-68B-60
DG5S-H8-*C-60	0, 1, 2, 3, 6, 9, 11, 31, 33, 52, 521	DG4V-3S-6C-60
DG5S-H8-*C-70		DG4V-3-6C-60
DG5S-H8-*C-60		DG4V-3S-68C-60
DG5S-H8-*C-70	4 & 8	DG4V-3-68C-60
DG5S-H8-*N-60	0, 1, 2, 3, 6, 9, 11, 31, 33	DG4V-3S-6N-60
DG5S-H8-*N-70		DG4V-3-6N-60
DG5S-H8-*N-60		DG4V-3S-68N-60
DG5S-H8-*N-70	4 & 8	DG4V-3-68N-60

See pilot valve service drawing for parts breakdown



- ▲ Included In F3 Seal Kit 696895
- ★ Included In Plug Kit 941167
- Included In Fastener Kit 941175
- ◆ Not Available For Sale
- ♣ Used On Check Valve Models Only
- Plug Torques (See Table)
- Available Only In Kit Of 25 Each

PILOT STAGE BOLT KIT (INCLUDES 4 ATTACHING BOLTS)

MODEL	BOLT KIT
W/O Pilot choke	696892
W/ Pilot choke	696893
Torque 4.5-5.7 N. m. (39.8-50.4 lb. in.)	
See pilot choke service drawing for parts breakdown	

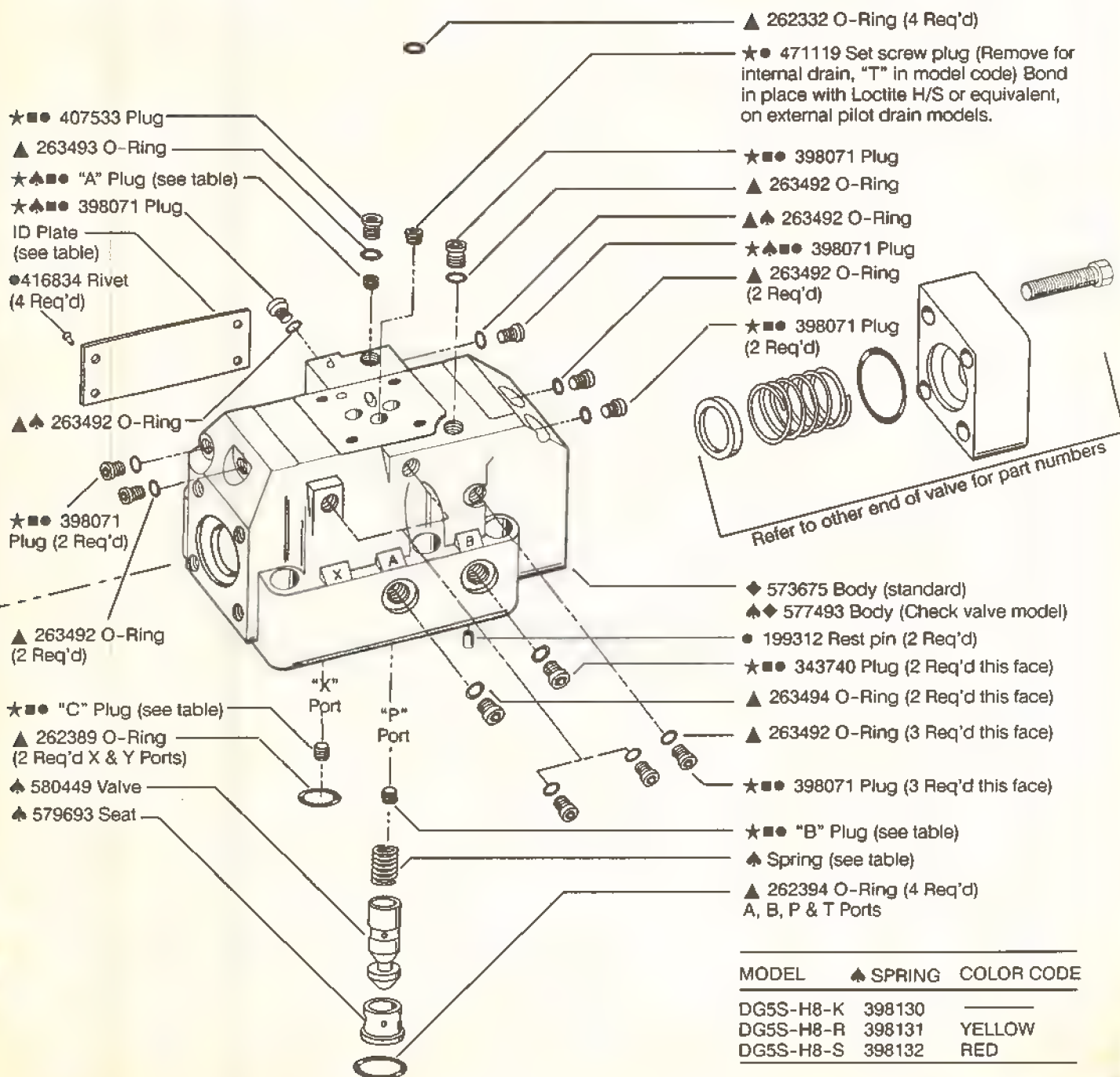
This solenoid removed on right hand A & B models. Refer to service drawings for more detailed information on left hand valves.

■ PLUG INSTALLATION TABLE

MODEL	"A" PLUG	"B" PLUG	"C" PLUG
DG5S-H8-**-	DOES NOT EXIST	237588	—
DG5S-H8-**-E		113000	237588
DG5S-H8-**-X		—	—
DG5S-H8-**-X-E		113000	—
DG5S-H8-**-KRS	237588	DOES NOT EXIST	—
DG5S-H8-**-E-KRS	113000		237588
DG5S-H8-**-X-KRS	—		—
DG5S-H8-**-X-E-KRS	113000		—

★ 113000 Solid plug

★ 237588 Orifice plug



(F3) - CVC - ** - ** - ** - **** - 10 - (*) - (N*) - (****)

1 2 3 4 5 6 7 8 9 10 11

1 Special Seals
Seals for mineral
oil & fire resistant
fluids.

2 Cartridge Valve Cover

3 Cartridge Valve Size (mm)
16, 25, 32, 40, 50, 63

4 Function
Directional Valve
N,D1,PC,W,W11,
W21,W31,A,AD1
Pressure Relief
C,C1,U,U1
Pressure Reducing
X,X1

5 Plugs, Seals, Bolts
Plugs B - BSP Thd. (Europe)
S - SAE Thd. (USA)
Seals 1 - DIN 3770 (Europe)
2 - ISO 3601 (Europe
& USA)
Bolts 9 - Metric (Europe)
Blank - Without bolts
(USA)

6 Adjuster Mechanism
(A,AD1,C,C1,U,U1,X,X1 Only)
M - Micrometer Knob
K - Micrometer Knob
with key lock
W - Rod with lock nut

7 Adjuster Pressure Range
(A,AD1,C,C1,U,U1,X,X1 Only)
125 3 - 125 bar (44-1800 psi)
245 5 - 245 bar (72-3550 psi)
350 8 - 350 bar (116-5000 psi)

8 Design

9 Model Suffix
For special features

10 -AD1 Function
(Omit for other cover types)
NC - Normally Closed
NO - Normally Open

11 Orifice Location/Size*
(Omit if not required)
X08 - 0.8mm orifice @ 'X' port
Z112 - 1.2mm orifice @ 'Z1' port
AP99 - No orifice in 'AP' port
Z200 - Solid plug @ 'Z2' port

* Orifices may be removed or added to the cartridge valve cover to fine tune the system. If the model code on the cover nameplate has a letter/number code after the design, orifices are installed into specific port locations, different from the standard assembly. Example: -10-X08 indicates an 0.8mm orifice is installed into the 'X' port, within the cover. Orifices may be installed in the 'X', 'Z1', 'Z2', 'P', 'A', 'B' and 'AP' port, depending on cover type and application. Refer to the Appendix for standard orifice locations and sizes for each cartridge valve cover.

Table 1. Model Code for Cartridge Valve Cover (CVC)

**Seals for mineral
oil & fire resistant
fluids.**

Cartridge Valve Size (mm)

Function

D11 (1:1.1)
D11 with office
U, U1

$R(1:2)$	X_1
$N,D1,D2$	$X,X1$

1 - DIN 3770 (Europe)
2 - ISO 3601 (Europe)

* – Most common insert/cover combinations

Table 2. European Service Drawings
for CVU Cartridge Valves

Cartridge Valve Type	Installation Drawing	Parts Drawing
Directional	GB-V-1501	S-F-40556
Pilot Operated Check	GB-V-1501	S-F-40557
Shuttle	GB-V-1501	S-F-40557
Pressure Relief	GB-V-1502	S-F-40558
Pressure Reducing	GB-V-1503	S-F-40559

SECTION II - DIRECTIONAL COVERS

The function of the directional cover assembly is to direct flow from one port to another. Seven types of directional covers are available. The type of directional cover used depends upon application requirements. The seven types of directional covers and their respective functional symbols are listed below.

Cover Type	Functional Symbol	Size (mm)
N Directional		16, 25, 32, 40, 50, 63
A Directional with Stroke Adjuster		16, 25, 32, 40, 50, 63
D1/D2 Directional with Pilot Interface (D1 Function Shown)		16, 25, 32, 40, 50, 63
D1/D2 Directional with Pilot Interface (D2 Function Shown)		(D1 Function) 16, 25, 32, 40
		(D2 Function) 50, 63
AD1 Directional with Pilot Interface & Stroke Adjuster		25, 40
W Shuttle		16, 25, 32, 40
W11/W21/W31 Shuttle with NPPA-D03 Pilot Interface (W11 Shown)		16, 25, 32, 40
PC Pilot Operated Check		16, 25, 32, 40

A. Directional (N Function)

This directional cover assembly is available in 16, 25, 32, 40, 50 and 63mm size. The directional cover assembly (shown in Figure 3) contains a pilot pressure passage with an orifice to control the opening and closing rate of the poppet that is located within the cartridge insert. The poppet is controlled by an externally operated pressure source. With sufficient pressure at pilot port 'X', the poppet is closed and flow between 'A' and 'B' port is blocked. The poppet moves upward and flow is from port 'A' to port 'B' when the 'X' port is drained to tank. The amount of pressure required to move the poppet depends upon the insert area ratio and the spring force. Flow is created from 'B' port to 'A' port when the 'X' port is connected to tank and pressure at 'B' port exceeds the pressure at 'A' port plus the equivalent pressure of the spring force. The standard directional cover operation is shown in Figure 3a.

Figure 3. Directional Cover (N Function)

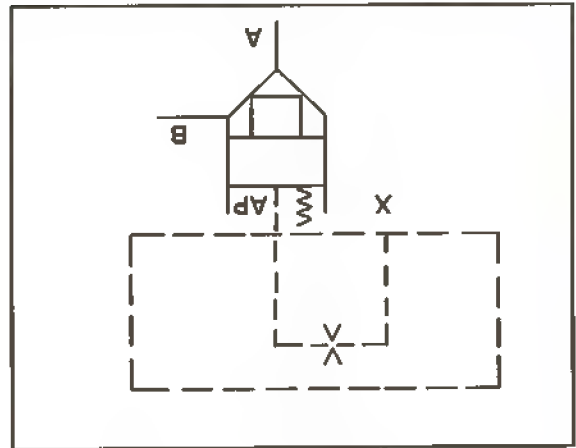


Figure 3a. Directional Cover Operation

B. Directional with Stroke Adjuster (A Function)

This cover assembly is available in 16, 25, 32, 40, 50, and 63mm size. The cover assembly provides directional control and flow regulation in a single unit. Flow regulation is obtained by limiting the travel or stroke of the insert poppet. The throttle opening is set by the position of a rod which extends into the cartridge insert spring chamber. The rod forms a stop to prevent the poppet from fully opening.

Three types of adjustments are available - lock-nut (W), the micrometer (M), and micrometer locknut adjustment (K). Refer to Figure 4 for the basic locknut adjustment (W) arrangement. The micrometer adjuster provides precise control with the capability of returning to a previous pressure setting when desired. The three adjuster types are described in more detail in Section VII.

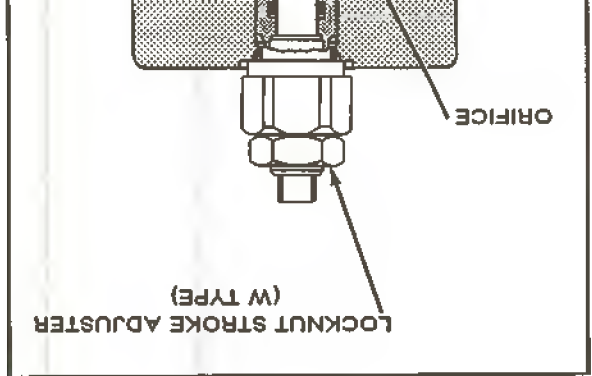


Figure 4. Directional Cover with Stroke Adjuster (A Function)

C. Directional with NFPA-D03/D05 Pilot Interface (D1 & D2 Function)

This type of cover assembly is available in 16, 25, 32, 40, 50 and 63mm size. The 16, 25, 32 and 40mm covers have a NFPA-D03 interface for mounting a DG4V-3 pilot valve. See Figure 5. The 50mm and 63mm covers have a NFPA-D05

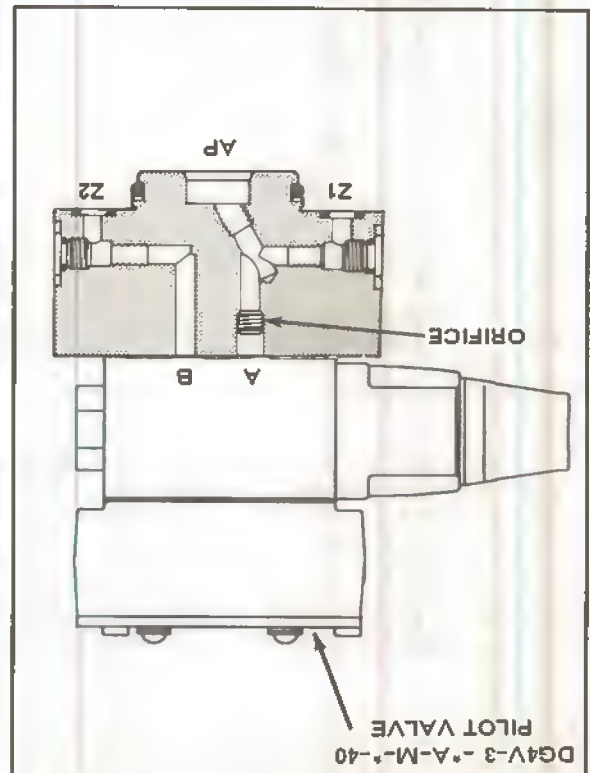


Figure 5. Directional Cover with ISO-4401-03/NFPA-D03 Pilot Interface (Formerly NFPA-D01) 'D1' Function

interface for mounting a DG4S4-01 pilot valve. See Figure 5a. Refer to Table 3 for pilot valve information. The difference between the two cover sizes is the interface porting relationship to ports 'Z1' and 'Z2'. The integrally mounted pilot valve provides a compact, convenient package for pressure source switching to control the opening and closing of the insert poppet.

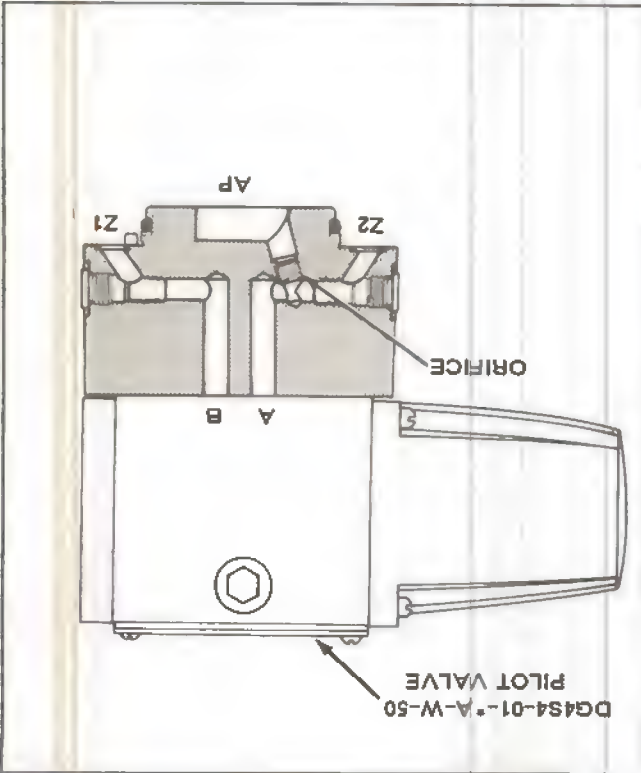
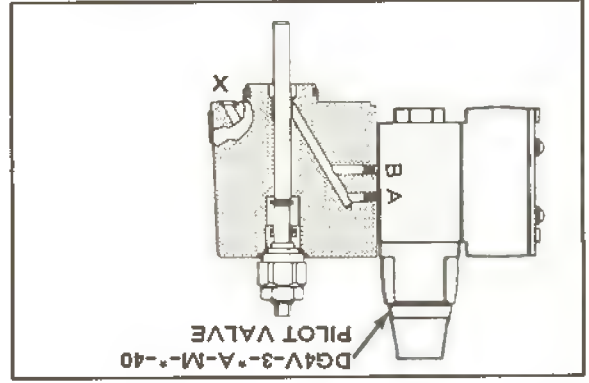


Figure 5a. Directional Cover with ISO-4401-05/NFPA-D05 Pilot Interface (Formerly NFPA-D02) 'D2' Function

NFPA-D03 INTERFACE			NFPA-D05 INTERFACE		
Model	Parts Drawing	Installation Drawing	Model	Parts Drawing	Installation Drawing
DG4V-3*-A-40	I-3861-S	517351	DG4S4-01*-A-W-50	I-3557-S	517410
DG4V-3*-B-40	I-3862-S		DG4S4-01*-B/C-W-50	I-3558-S	
DG4V-3*-C-40	I-3863-S		DG4S4-01*-N-W-50	I-3559-S	
DG4V-3*-F-40	I-3864-S		DG4S4-01*-A-50	I-3478-S	
DG4V-3*-N-40	I-3865-S		DG4S4-01*-C-50	I-3477-S	
				DG4S4-01*-N-51	I-3471-S

Table 3. Pilot Valve Information

D. Directional Cover with NFPA-D03 Pilot Interface and Stroke Adjuster (AD1 Function)



This type of cover combines the pilot interface and stroke adjuster feature. The pilot valve switches pressure to or from the 'AP' port to open or close the poppet. The flow is then regulated by the stroke adjuster to a desired flow rate. This type of cover combination is only available in the 25 and 40mm valve size. With the pilot valve de-energized, the insert poppet is normally open when a solid plug is installed at the 'A' port and an orifice plug is installed at the 'B' port of the cover (interface location). The insert poppet is normally closed when the solid plug and orifice plug location is reversed (ie. orifice plug installed at 'A' port and a solid plug installed at 'B' port). Figure 6 illustrates the AD1 cover mounted to a DG4V-3 pilot valve. Figure 6a shows the AD1 cover operation.

Figure 6. Directional Cover with Pilot Interface & Stroke Adjuster (AD1 Function)

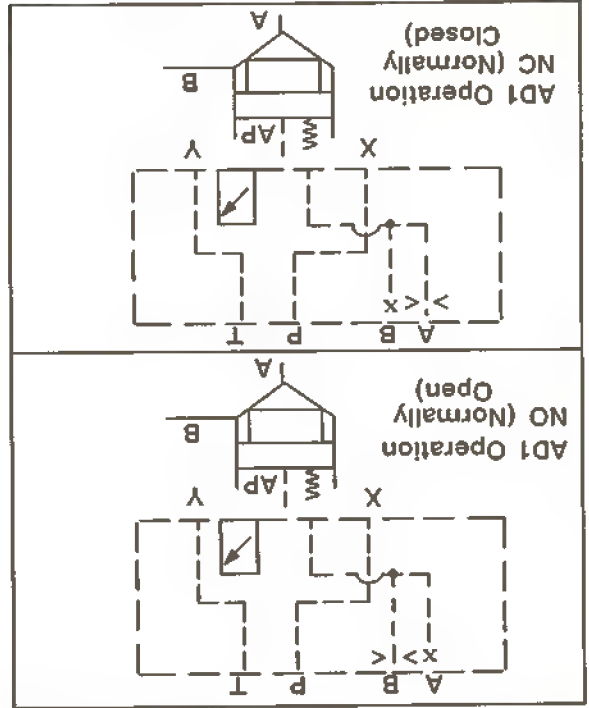


Figure 6a. AD1 Cover Operation

E. Shuttle (W Function)

This shuttle cover assembly is available in the 16, 25, 32 and 40mm size. The shuttle cover will take the higher of two pressures and direct it into the pilot spring area (AP) of the cartridge valve insert. Orifices are available in the cover to control reaction time of the poppet. A seat is pressed into the cover bore and a ball is inserted. The outer plug is then installed into the cover. The outer plug retains the ball and seat between the spring area (AP) and the 'Y' port. The outer plug also has an O-ring and back-up ring to prevent leakage between the (AP) and 'Y' port areas. Figure 7 shows the construction of a shuttle cover (W Function) assembly. The shuttle valve operation is illustrated in Figure 7a.

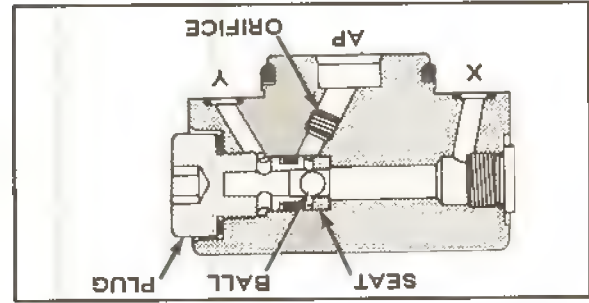


Figure 7. Shuttle Cover Assembly (W Function)

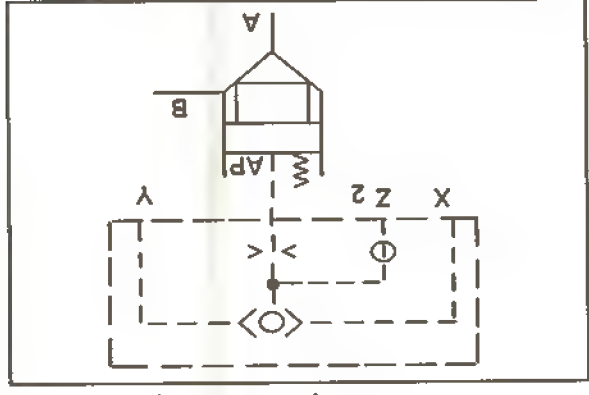


Figure 7a. Shuttle Valve Operation (W Function)

F. Shuttle / NFPA-D03 Pilot Interface (W1, W21 & W31 Function)

Shuttle covers that have the NFPA-D03 pilot interface are available in the 16, 25, 32 and 40mm sizes. Pilot interface shuttle covers have three configurations: type W11, W21 and W31.

In the W11 cover, when the pilot valve solenoid is de-energized, the cartridge is shut by the higher of the pressures at 'X' or 'Y'. Pilot port 'Z2' can be used to simultaneously pilot a second cartridge.

In the W21 cover, when the solenoid is de-energized, the cartridge is shut by the higher of the pressures 'X' or 'Y'. Type W21 differs from W11 in that port 'Z2' senses pressure between the shuttle and the 'P' port of the DG4V-3. It is inde-

Figure 8. Shuttle Cover Construction (NFA-D03 Pilot Interface) (W11, W21, W31 Function)

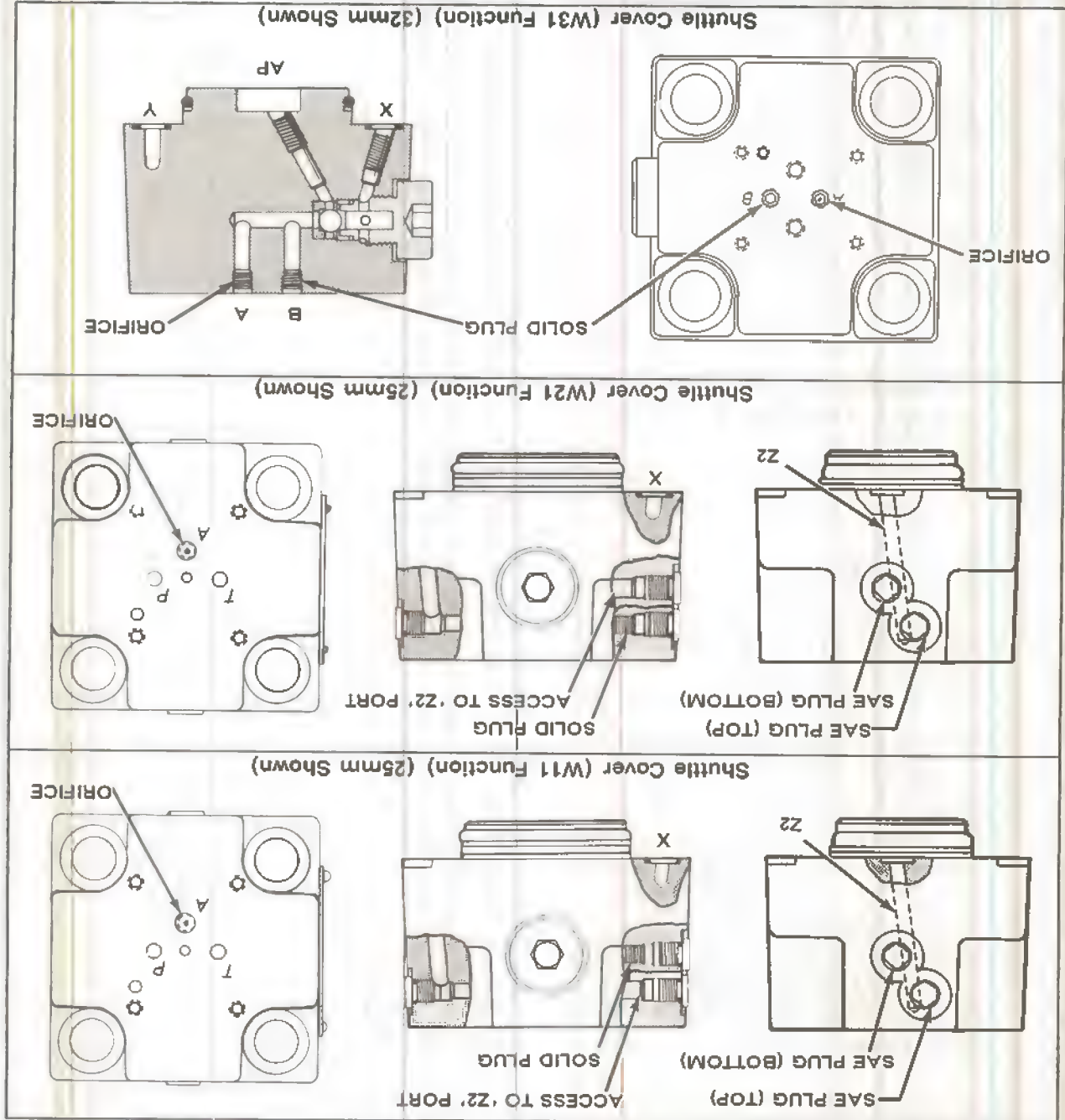


Figure 8 illustrates the three types of shuttle cover configurations and their respective plug locations. Refer to Figure 23 and 23a for parts breakdown. Refer to Table 3 for pilot valve drawings.

Type W31 cover is completely different. Its function is to provide a non-reverse flow check, eliminating the need for a separate back flow check. This is achieved by the installation of a solid plug in the 'B' port and an orifice in the 'A' port of the interface.

In the 16mm size (W21 Function), the solid plug is located behind the top SAE plug. In the 25, 32 and 40mm size (W11 Function), the solid plug is located behind the bottom SAE plug. In the 25, 32 and 40mm size (W21 Function), the solid plug is located behind the bottom SAE plug. In the 25, 32 and 40mm size (W11 Function), the solid plug is located behind the bottom SAE plug.

Type W11 and W21 use the same cover, however, the difference between the two is the external porting, which accesses 'Z2'.

In the 16mm size (W11 Function), the solid plug is located behind the top SAE plug. In the 25, 32 and 40mm size (W11 Function), the solid plug is located behind the bottom SAE plug. In the 25, 32 and 40mm size (W21 Function), the solid plug is located behind the bottom SAE plug. In the 25, 32 and 40mm size (W11 Function), the solid plug is located behind the bottom SAE plug.

DG4V-3.

Figure 8a illustrates the operation of the shuttle valve for the W11, W21 and W31 functions.

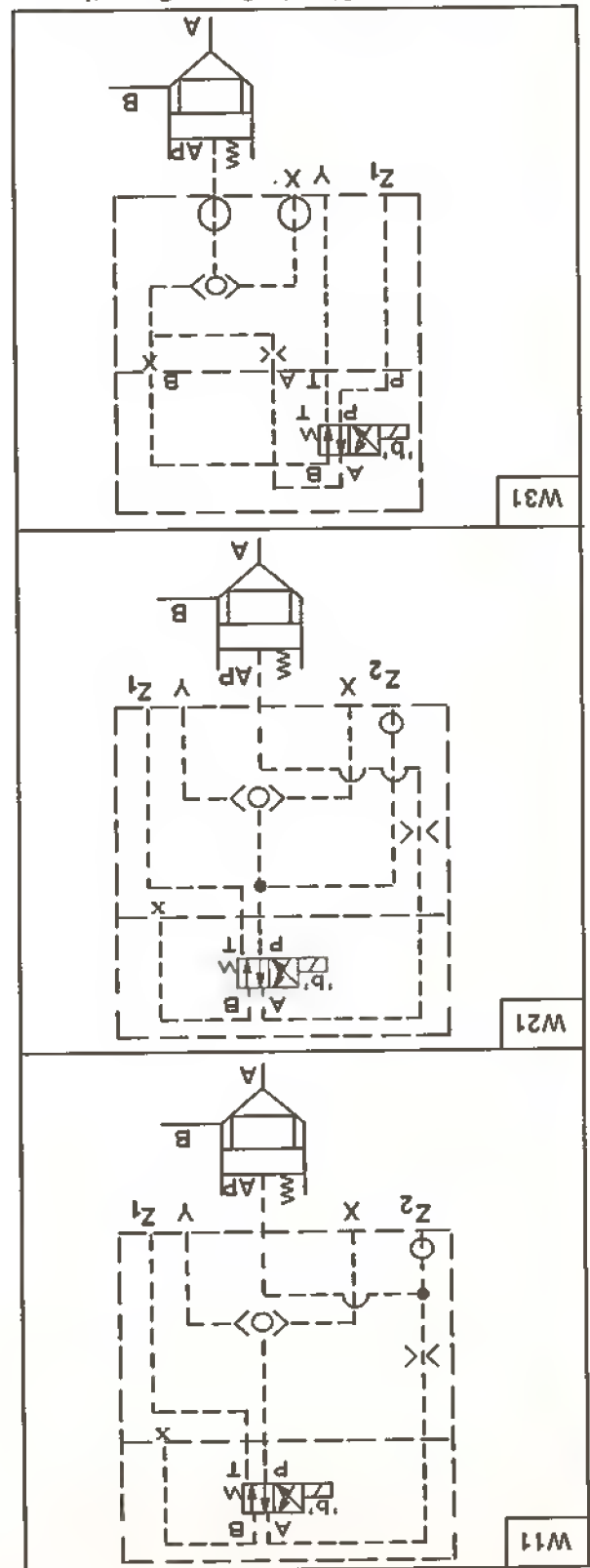


Figure 8a. Shuttle Cover Operation (W11, W21 and W31 Functions)

G. Pilot Operated Check (PC Function)

The pilot operated check cover assembly is available in the 16, 25, 32 and 40mm size. Figure 9 shows the construction of a pilot operated check cover. Three pilot ports are used:

- The 'X' port is drilled in the manifold block to the pilot signal.
- The 'Y' port is drilled in the manifold block to connect with the 'B' port of the insert.
- The 'Z1' port is normally connected to a drain line or tank port.

A simple check valve is created when there is no signal at the 'X' port. Flow can pass from 'A' to 'B' if the pressure in the 'A' port is greater than 'B' plus the spring force. Flow is blocked from 'B' to 'A'. See Figure 9a.

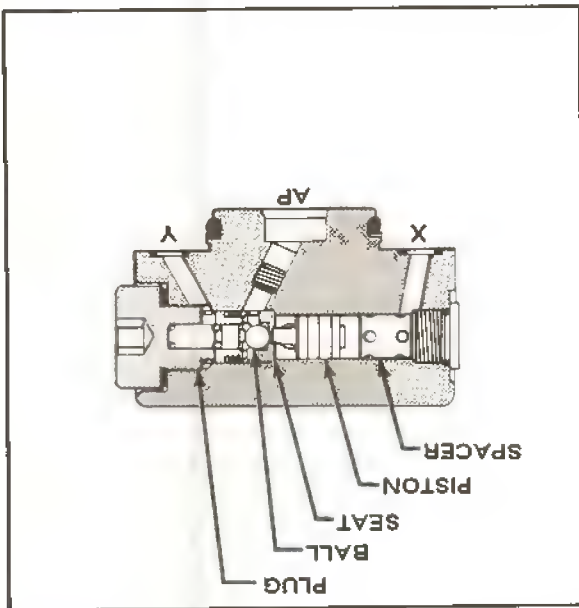


Figure 9. Pilot Operated Check Cover (PC Function)

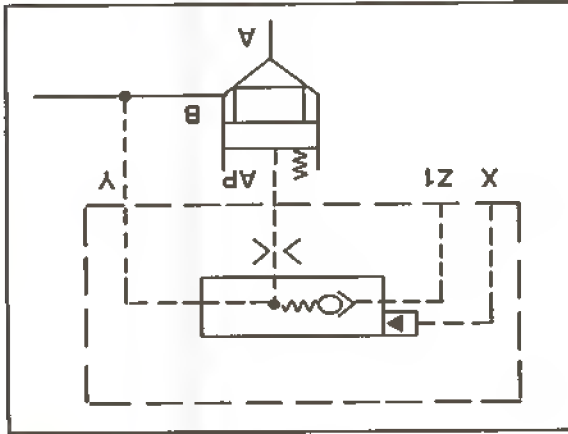


Figure 9a. Pilot Operated Check Operation

SECTION III - PRESSURE RELIEF

COVERS

The pressure relief cover assembly is used to limit system pressure to a desired pressure setting. The pressure setting is determined by the cover spring force and the adjuster mechanism position. Pressure relief covers are available in the 16, 25, 32 and 40mm size. Four types of pressure relief covers are available. The pressure relief covers and their respective functions and sizes are listed below.

Cover Type	Functional Size (mm)	Pressure Relief	Pressure Relief with NFPA-D03 Pilot Interface	Unloading	Unloading with NFPA-D03 Pilot Interface
C	16, 25, 32, 40				

A. Pressure Relief (C Function)

This pressure relief cover assembly is available in the 16, 25, 32, and 40mm size. The cover assembly (shown in Figure 10) consists of a seat, piston, spring, orifice plugs, seals, and a pressure adjuster mechanism. The adjuster mechanism may be the basic locknut, the micrometer, or the micrometer with keylock type.

Figure 10a illustrates the operation of the pressure relief valve. The orifice plug at the (AP) area dampens the reaction time of the insert poppet and prevents instability. When system pressure at the 'A' port area exceeds the pressure at the (AP) area, the insert poppet lifts off its seat and allows flow from 'A' port to 'B' port (tank). This relieves system pressure at the 'A' port.

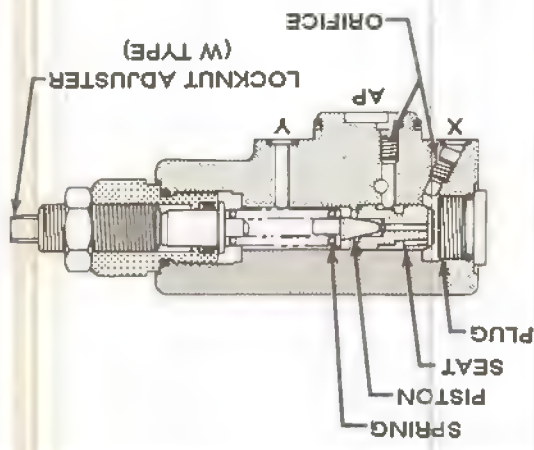


Figure 10. Pressure Relief Cover (C Function)

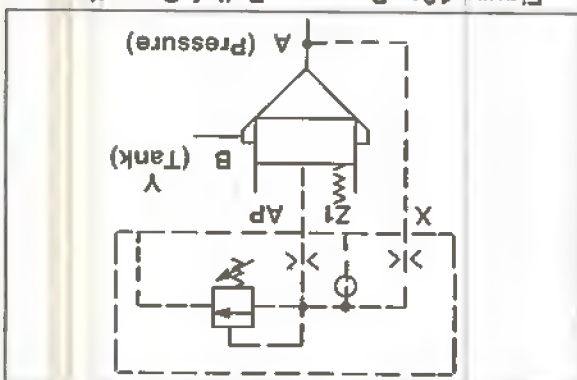


Figure 10a. Pressure Relief Operation

B. Pressure Relief Cover with NFPA-D03 Pilot Interface (C1 Function)

This cover assembly (shown in Figure 11) is available in the 16, 25, 32, and 40mm size and is used for mounting a pilot valve such as a DG4V-3-**-40 or CGE-02-**-22. The cover functions like the standard relief except the pressure from 'A' is either blocked or directed to tank by the pilot valve. See Figure 11a. When the pilot valve solenoid is de-energized, the relief valve is vented to tank. The relief valve operates at its relief valve pressure setting, when the pilot valve solenoid is energized. The 'Z1' port is a remote vent connection. Block the 'Z1' port if the remote vent feature is not used.

Venting the valve by opening 'Z1' to tank will permit flow to occur from 'A' to 'B' at low pressure. Vent pressure will be equivalent to the spring force on the cartridge poppet plus any back pressure present in the vent line. The 'AP' area is connected internally within the cover to the 'Z1' port.

A pressure relief module (CVGC-3-*-**-10) may be installed between the pilot valve and the relief valve cover on 16, 25, 32 and 40mm cartridge valves. The CVGC-3 module is used on applications that require both a low and high pressure relief setting. Figure 11b illustrates a cartridge valve arrangement with the pressure relief module. Refer to Table 4 for the pressure relief module.

Figure 11a. Pressure Relief Operation with Pilot Interface

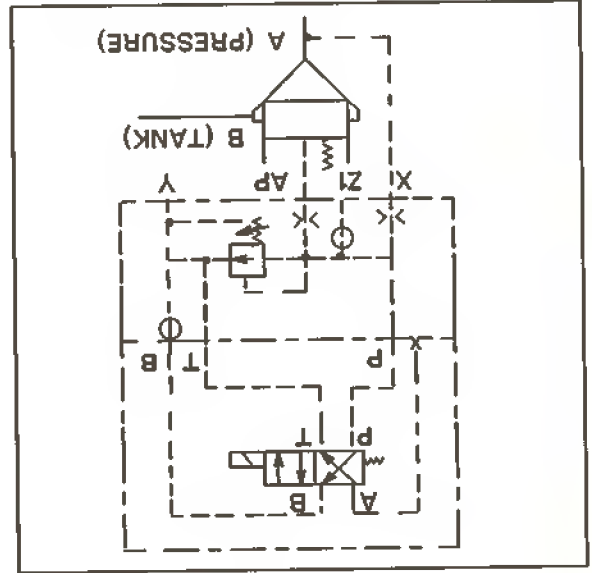
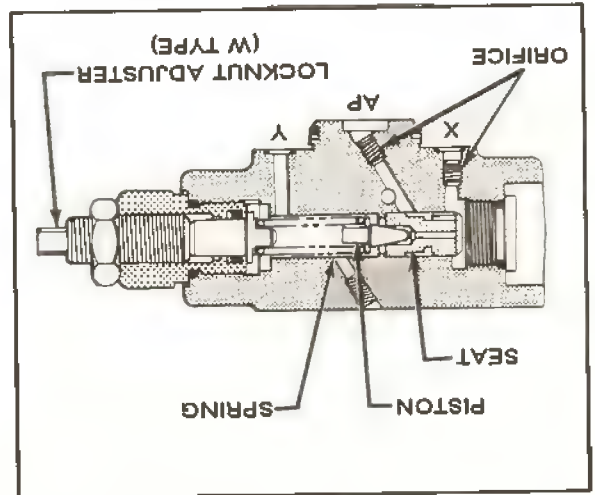


Figure 11. Pressure Relief Cover with Pilot Interface (C1 Function)



NOTE
If a CGE-02 pilot valve is used, install a solid plug into the top of relief valve cover at the 'B' port location to avoid external leakage. See Table 10 for orifice kits. Refer to parts drawing I-3695-S and installation drawing 519205 for CGE-02 applications.

the model code breakdown. In all applications, the highest pressure setting is controlled by the cover and the lower pressure setting is controlled by the CVGC-3 module.

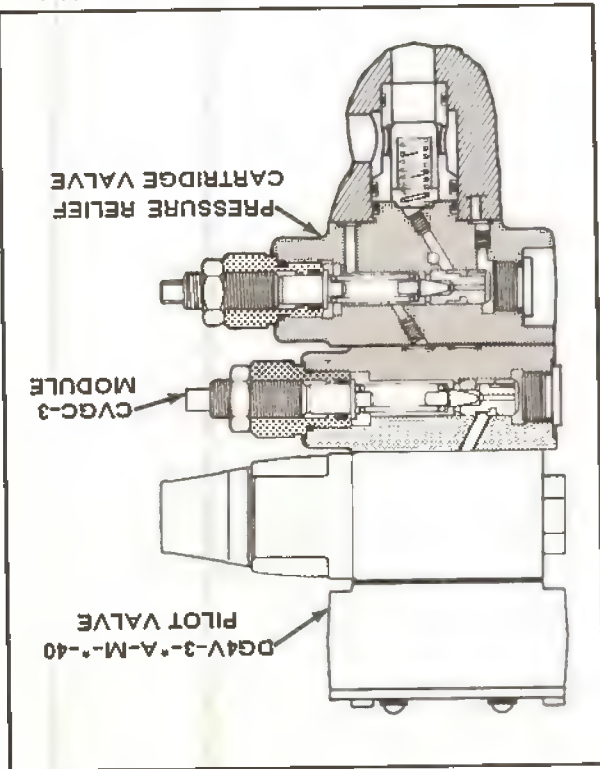
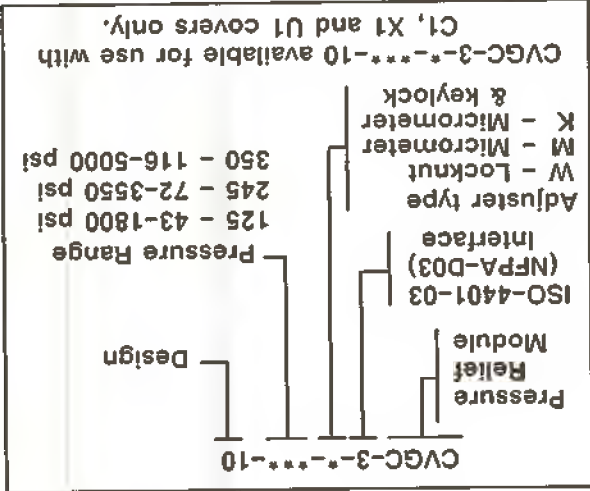


Figure 11b. Pressure Relief Cartridge Valve with Pressure Relief Module for Dual Pressure Control



Note: 14.5 psi = 1 bar
Table 4. Model Code for Pressure Relief Module

C. Unloading (U Function)

This type of cover assembly is similar to the pressure relief cover. Available sizes are 16, 25, 32 and 40mm. The valve is unloaded when the pressure at the 'X' port reaches 85% of the relief pressure setting. The 'X' port is independent of the other ports. Venting is controlled through the 'Z1' port. System pressure is sensed through the 'AX' orifice in the insert poppet. Figure 12a illustrates the unloading valve operation.

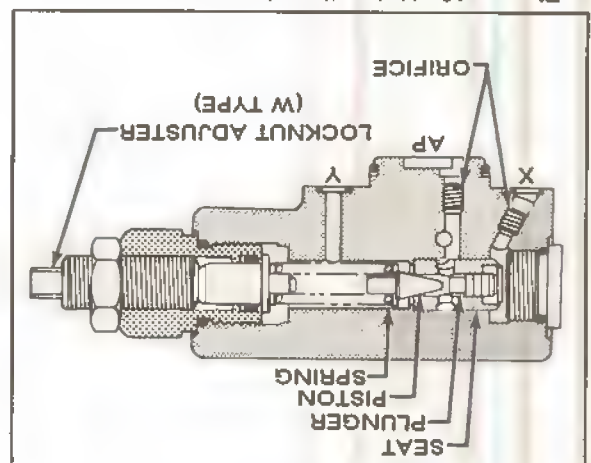


Figure 12. Unloading Cover (U Function)

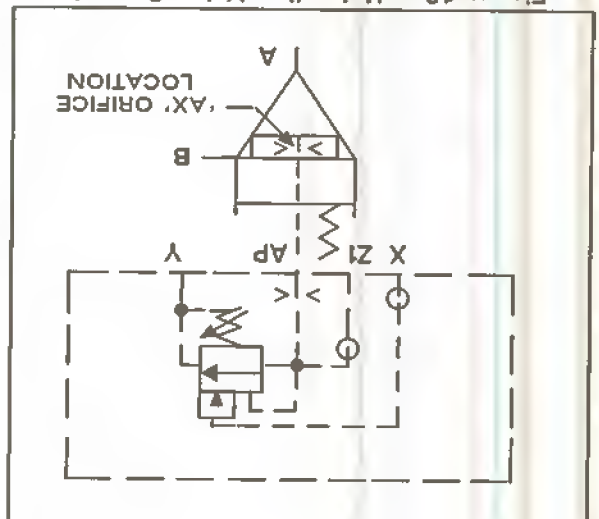


Figure 12a. Unloading Valve Operation

D. Unloading with NFA-D03 Pilot Interface (U1 Function)

This type of cover assembly is available in the 16, 25, 32 and 40mm size. When the pilot valve sol-

enoid is energized, system pressure is at the maximum level set by the adjuster on the cartridge cover. The unloading function is controlled through the 'X' port. System pressure is vented to tank when the pilot valve solenoid is de-energized. Figure 13 shows the construction of the cover assembly. Figure 13a illustrates the unloading operation with a pilot valve. Note that the insert poppet has an 'AX' orifice.

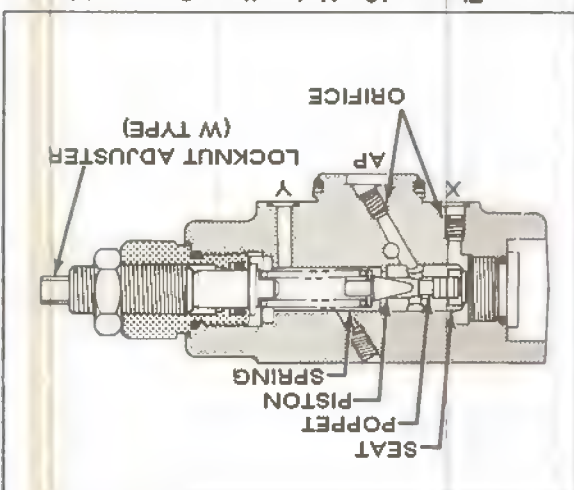


Figure 13. Unloading Cover with NFA-D03 Interface (U1 Function)

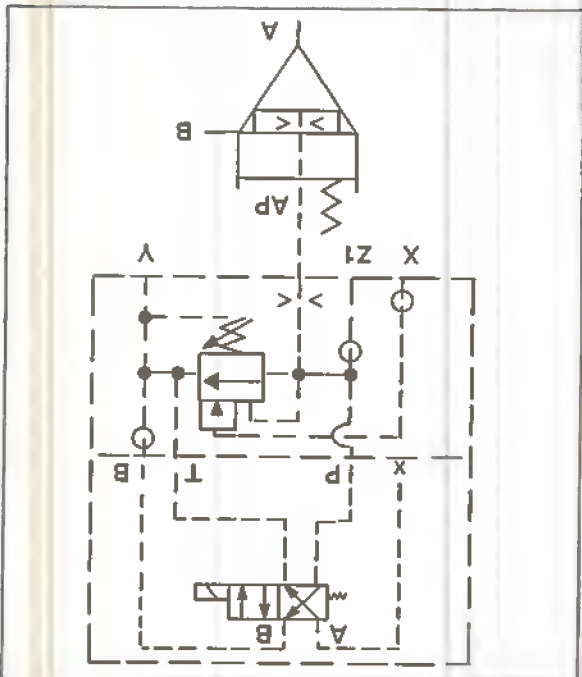


Figure 13a. Unloading Operation with Pilot Valve

SECTION IV - PRESSURE REDUCING COVERS

The function of the pressure reducing cover assembly is to provide a constant outlet pressure that is below inlet pressure. Two types of pressure reducing covers are available. The pressure reducing covers and their respective functions and sizes are listed below.

Cover Type	Functional Symbol	Size (mm)
X		16, 25
X1		16, 25

A. Pressure Reducing (X Function)

Pressure reducing covers are assembled without orifices unless specified by a model code suffix.

Figure 14 shows the construction of a pressure reducing cover assembly. The cover consists of a seat, piston, spring, flow control, seals, and a pressure adjuster mechanism. This cover assembly is available in the 16 and 25mm size.

Figure 14a shows the operation of a pressure reducing valve. The 'B' port is connected to the pressure source. The 'B' port and 'X' port are interconnected within the manifold block. System pressure ('B' port) is fed to the 'X' port to the constant flow across the poppet independent of the flow from 'B' port to 'A' (p2). When load pressure rises at the 'A' port, the insert spool moves to restrict flow to the load. If load pressure drops below the cracking pressure within the cover, the insert spring will move the insert poppet to increase flow through the valve to the 'A' port and increases the pressure in the 'A' port to the desired reducing pressure setting.

A check valve is located within the insert poppet to relieve pressure peaks at the load. Outlet pressure will drop to its minimum pressure setting when 'Z1' port is vented.

Figure 14. Pressure Reducing Cover (X Function)

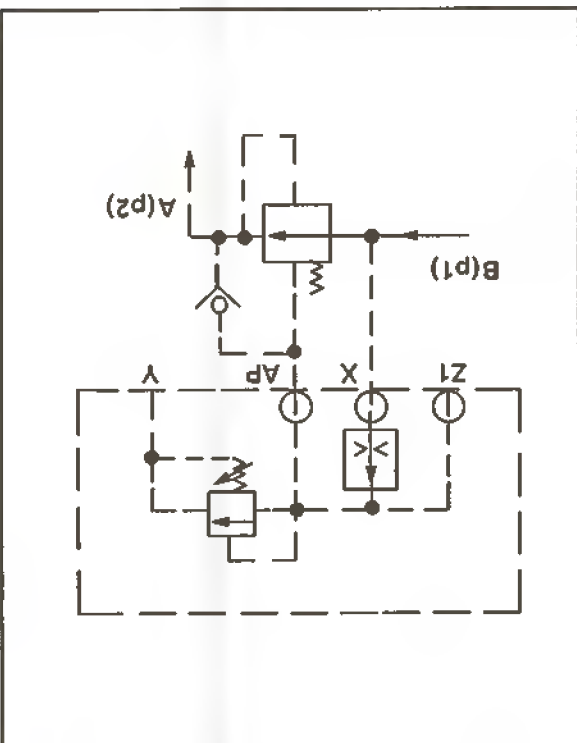
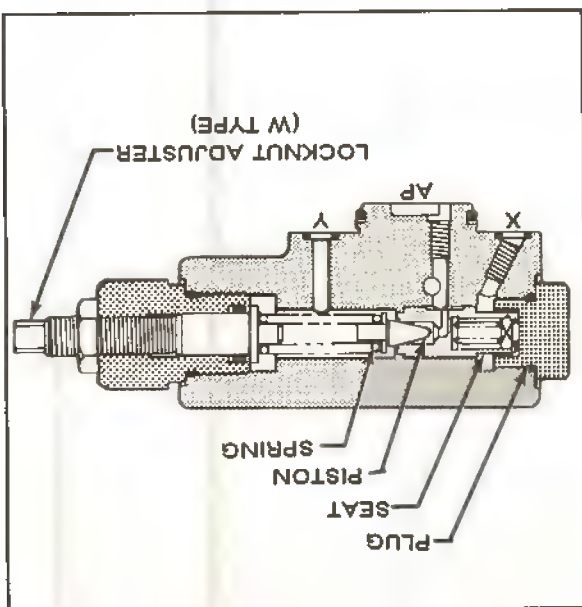


Figure 14a. Pressure Reducing Operation

B. Pressure Reducing with NFA-D03 Pilot Interface (X1 Function)

This cover assembly (shown in Figure 15) is available in the 16 and 25mm size. This type of cover assembly has an NFA-D03 interface for mounting a DG4V-3-AL-40 pilot valve, a CGE-02 pilot valve, or a CVGC-3-10 pressure relief module. The pilot valve provides an integral control of the low or high reduced pressure setting. Pressure reducing operation with a pilot valve is shown in Figure 15a.

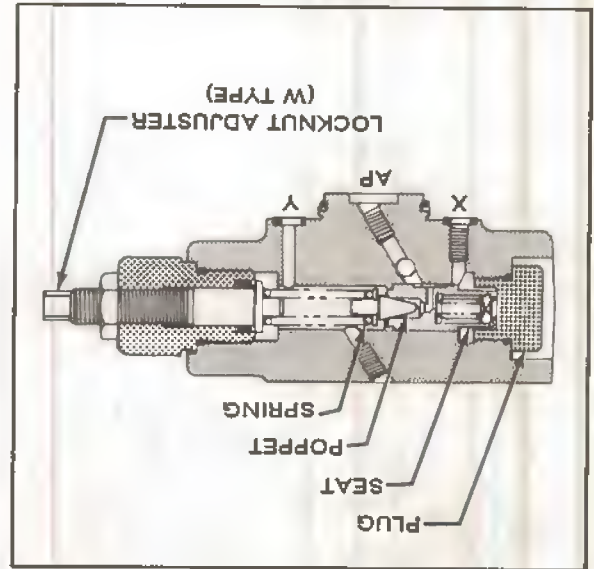


Figure 15. Pressure Reducing Cover with Pilot Interface (X1 Function)

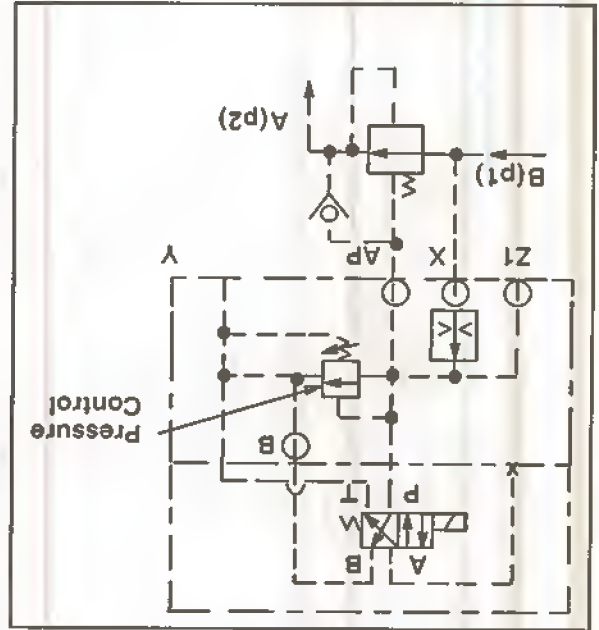


Figure 15a. Pressure Reducing Operation with Pilot Valve

When a CVGC pressure relief module is installed between the reducing cover and the pilot valve, the highest reduced pressure setting is controlled by the pilot valve and the lower reduced pressure setting is controlled by the CVGC module. The highest reduced pressure setting is active when the pilot valve is in the de-energized position. Provide at least 10 bar (150 psi) spread between the high and low pressure settings. Figure 15b shows the operation of a pressure reducing cartridge valve with dual pressure settings.

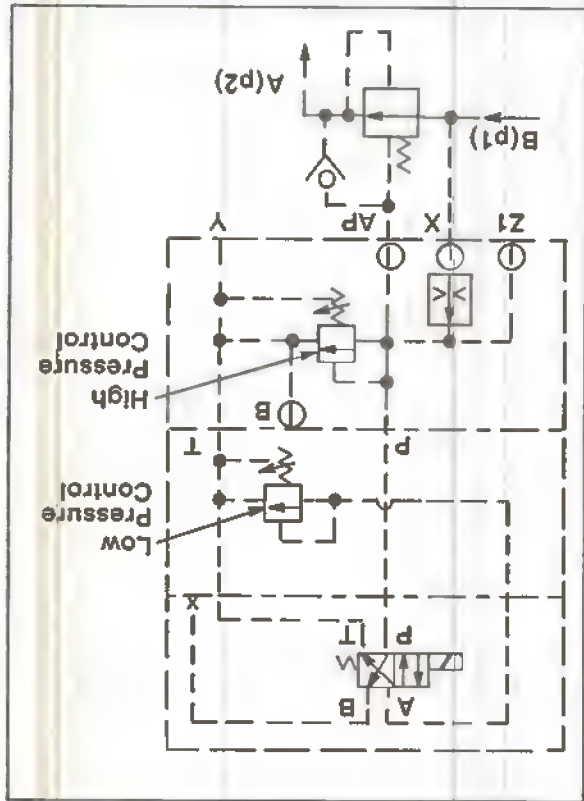


Figure 15b. Pressure Reducing Operation with Dual Pressure Settings

NOTE
If a CGE-02 pilot valve is used, the 'B' port must be plugged at the cover interface.

SECTION V - CARTRIDGE VALVE INSERTS

The cartridge insert functions as the working section of the cartridge valve. Flow passes through the valve when pressure from an external source exceeds the predetermined cracking pressure of the insert. The cracking pressure is determined by the poppet spring force.

The insert provides directional flow for normal applications and controlled flow or restrictive flow for sensitive applications. Seven basic types of inserts are available. The types of inserts and their respective functions and sizes are listed below.

Insert Type	Function	Functional Symbol	Size (mm)
Directional	D10		16, 25, 32, 40
Directional	D11		16, 25, 32, 40, 50, 63
Directional with Orifice	D11		16, 25, 32, 40
Directional	D20		16, 25, 32, 40, 50, 63
Restrictor	R		16, 25, 32, 40, 50, 63
Flow Control	F		16, 25, 32, 40, 50, 63
Reducing	X1		16, 25

A. Flow Ratings

The cartridge insert, unlike a spool type valve, does not have a malfunction flow (with the exception of the X1 pressure reducer insert). The poppet will open or close regardless of flow. As flow increases through the valve, a pressure drop will occur across the valve. Cartridge valves are rated by the amount of flow that passes through the valve with a 14.5 psi (1 bar) or 72.5 psi (5 bar) pressure drop. Table 5 provides flow ratings for 1:1 area ratios. Refer to the installation drawings (Table 8) for flow ratings on other area ratios.

Valve or Port Size (mm)	Port Size (inch)	Flow @ 14.5 psi (1 bar)		Flow @ 72.5 psi (5 bar)	
		(l/m)	(gpm)	(l/m)	(gpm)
16	0.63	80	(21)	200	(53)
25	0.98	190	(50)	450	(119)
32	1.25				
40	1.57	550	(145)	1100	(291)
50	1.97	900	(238)	1700	(449)
63	2.48	1100	(290)	2800	(740)

Table 5. Cartridge Valve Flow Ratings for 1:1 Area Ratios

B. Insert Kit Description

Figure 16 illustrates the standard cartridge insert kit with a 1:1 area ratio. The insert kit consists of a spring, poppet, sleeve, and associated seals. As illustrated in Figure 16a, the cartridge valve insert kit has three major areas; the 'A' port, the 'B' port and the 'AP' pilot port. The 'A' port area is circular and is defined by the poppet to sleeve sealing diameter. The 'B' port area is defined as the difference between the 'AP' area and the 'A' area. The 'AP' area is the circular area defined as the diameter at the top portion of the poppet. Pressure at the 'AP' area plus the spring force holds the poppet down. Pressure at the 'A' or 'B' area lifts the poppet off its seat and allows flow through the valve.

NOTE
Unlike all other cartridge inserts, the reducer insert contains a spool rather than a poppet. Therefore, no reference is made to an area ratio. The spool also incorporates an internal check valve which relieves pressure peaks at the load pressure.

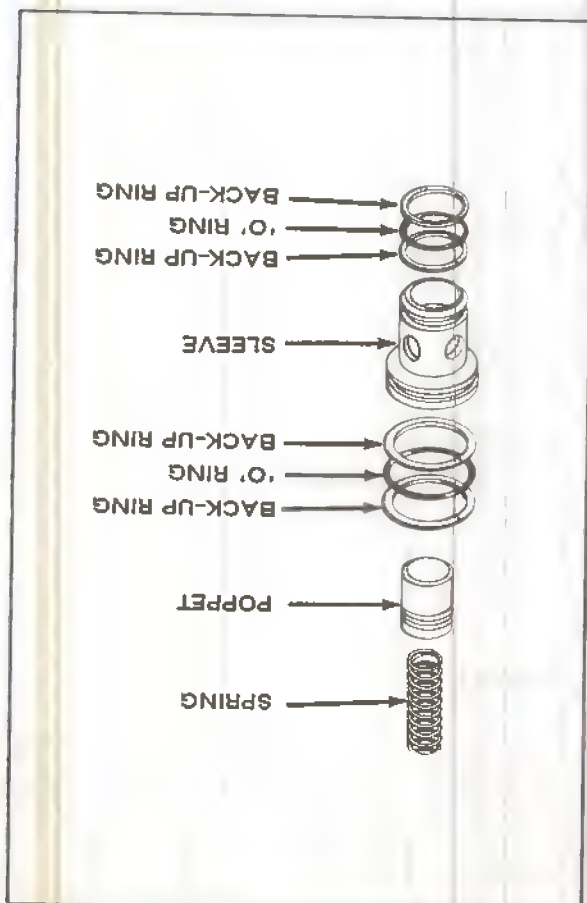


Figure 16. Cartridge Insert Kit

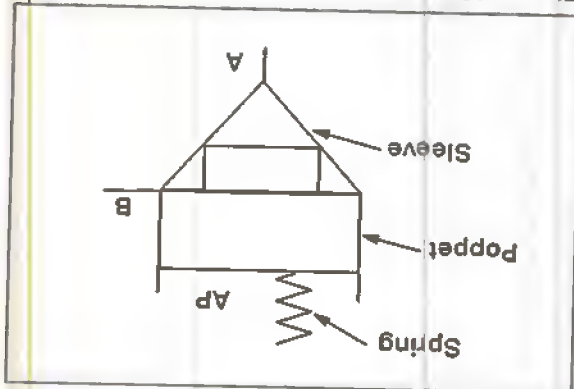


Figure 16a. Cartridge Insert Kit Operation

C. Insert Kit Identification

Four steps must be taken to determine the type of cartridge insert kit. These steps are:

1. Determine the metric size of the insert kit by measuring across the larger diameter of the sleeve. Refer to Table 6 below to establish the size. Note that the insert kit size is the same as the cover size.

Sleeve Size mm	Sleeve Size inch
16	1.260
25	1.771
32	2.362
40	2.952
50	3.543
63	4.724

Table 6. Sleeve Diameter

2. Determine the area ratio of the poppet. The poppet area ratio is determined by comparing (AP) area at the top of the poppet with the (A) area at the bottom of the poppet. For example, if the area at the top of the poppet is twice the area of the bottom portion of the poppet, the area ratio is 1:2. Three types of area ratios are available; 1:1, 1:1.1 and 1:2. Poppet area ratios are shown in figure 17.

NOTE

On pressure relief applications, a special 1:1.04 insert ratio must be used when the pressure setting exceeds 3600 psi (250 bar). Refer to Table 11 for insert kits.

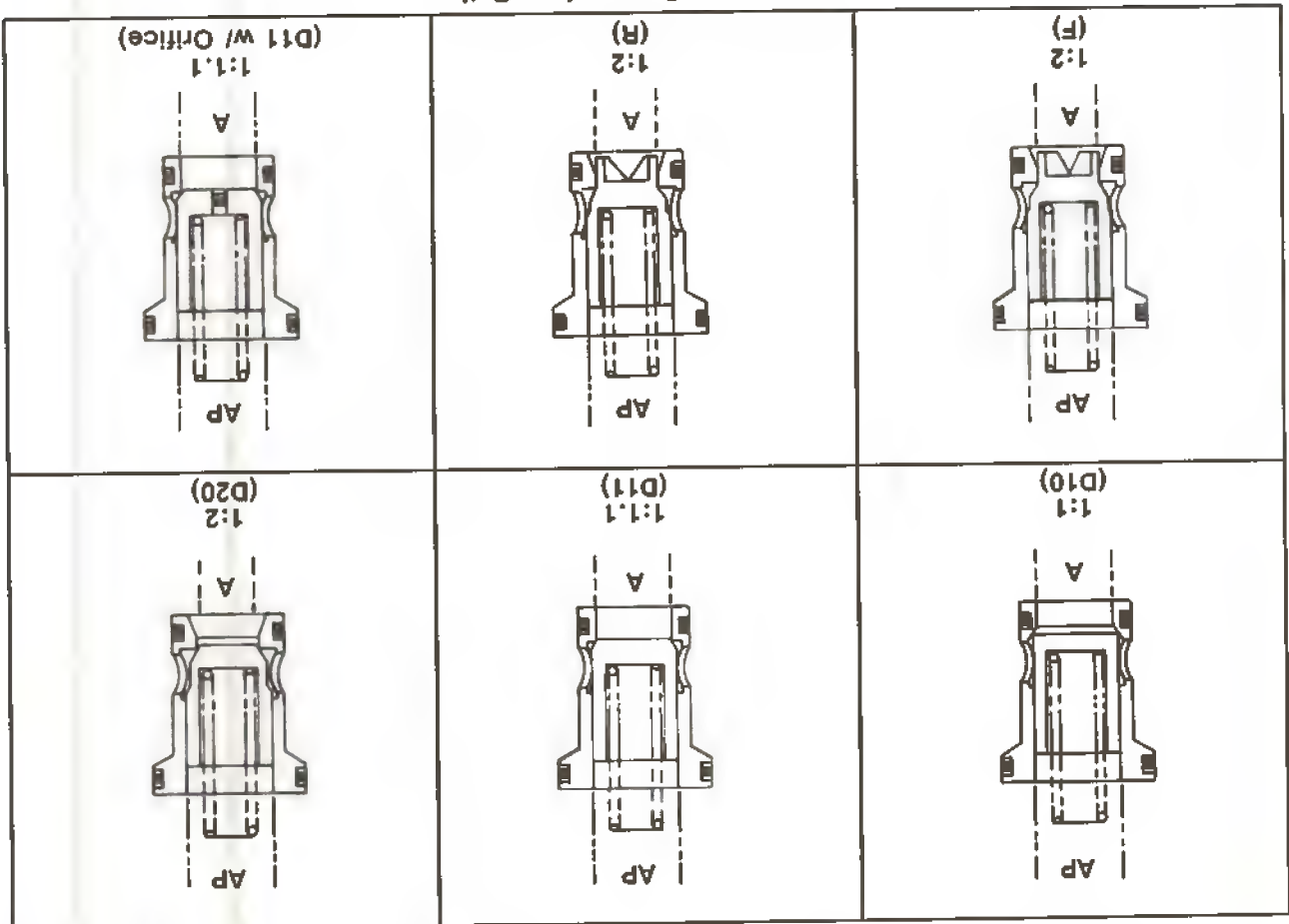


Figure 17. Poppet Area Ratios

3. Measure the insert spring wire diameter with a micrometer. This measurement will determine the cracking pressure of the spring.

NOTE

The spring may be color dyed for easier identification purposes. The spring color is cross referenced to a letter code that identifies spring cracking pressure. If the spring does not have a color, determine the spring cracking pressure by the wire diameter. Refer to Table 7 for the spring wire diameter and color code.

Valve Size	Insert Spring Diameter	Wire Diameter	Color Code	Letter Code
16mm	761564	0.039	White	L
	761565	0.055	Blue	M
	761566	0.063	Red	H
25mm	761567	0.059	White	L
	761568	0.079	Blue	M
	761569	0.098	Red	H
32mm	815220	0.079	White	L
	815221	0.104	Blue	M
	815222	0.128	Red	H
40mm	761570	0.098	White	L
	761571	0.118	Blue	M
	761572	0.150	Red	H
50mm	763674	0.138	White	L
	763675	0.181	Blue	M
	763676	0.217	Red	H
63mm	763712	0.171	White	L
	763713	0.232	Blue	M
	763714	0.276	Red	H

Note: L = Low Cracking pressure
M = Medium Cracking Pressure
H = High Cracking Pressure

(Refer to Table 12 for additional spring information)

Table 7. Insert Spring Dimensions

4. Determine the type of insert kit and its related function from Table 11. The insert function may be determined by the number/letter code that is stamped on the insert sleeve. See Figure 2a.

Section VI - SYSTEM INSPECTION & MAINTENANCE

A. Installation Drawings

The installation drawings listed in Table 8 show installation dimensions and port locations for cartridge valves.

Cartridge Valve Type	Installation Drawing No.
Directional & Check	519200
Pressure Relief	519210
Pressure Reducing	519205

Table 8. Installation Drawings

B. Mounting

In general, cartridge valve mounting is unrestricted. It is recommended that the cartridge valve be mounted on a horizontal axis when a detented pilot valve is attached to the cartridge cover assembly. Cartridge valves are designed to be installed into a manifold block. This minimizes external circuit connections and provides a very compact package. Each cartridge valve installation is unique for a specific application. Many valve functions can be obtained within the manifold block.

C. Piping and Tubing

If a cartridge valve manifold block is actuator mounted, only pressure and tank lines are required. All pipes, tubing, and manifold passages must be thoroughly cleaned. Recommended methods of cleaning are sandblasting, wire brushing, pickling and power flushing. Refer to instruction sheet I-1221-S for pickling information.

Maintain only the amount of connections and fittings that are necessary for proper installation. This will minimize flow resistance and the possibility of leakage.

The number of bends in the tubing should be kept to a minimum to prevent excessive turbulence and friction of oil flow. Tubing must not be bent too sharply. The recommended minimum radius for tube bending is three times the inside diameter of the tube.

D. Hydraulic Fluid Recommendations

Hydraulic fluid performs the dual function of lubrication and transmission of power. Hydraulic fluid constitutes a vital factor in a hydraulic system.

1. Very high fluid viscosity at start-up temperatures
2. Running the system with moderately high fluid viscosity
3. Improper circuit or reservoir design

Noise is only indirectly affected by fluid selection. However, the condition of the fluid is very important for obtaining optimum reductions of system sound levels. Some of the major factors that cause noise in a hydraulic system are:

G. Sound Level

1. Clean (flush) any new system to remove paint, metal chips, welding spatter, etc.
2. Filter each change of fluid to prevent the introduction of contaminants.
3. Provide continuous fluid filtration to remove sludge, products of wear, and corrosion that has generated during the life of the system. Maintain an ISO cleanliness code of 18/13 or cleaner. System cleanliness may be obtained through the use of Vickers OFF, ORF or OFRS series filters.
4. Seal the system to prevent the introduction of airborne contaminants.

Thorough precautions should be observed to insure the hydraulic system is clean at all times. Perform the following steps:

F. System Cleanliness

When hydraulic fluid is added to replenish the system, it should always be poured through a fine wire screen (200 mesh or finer) or preferably pumped through a 10 micron absolute filter. It is important that the fluid be kept clean and free from any substance that could cause improper operation or wear of the hydraulic unit. Therefore, the use of cloth to strain the fluid should be avoided.

E. Adding Fluid to the System

Item. Careful selection of the fluid should be made with the assistance of a reputable supplier. Proper fluid selection provides satisfactory life and operation of system components. Fluid selected for valves must also be acceptable for the system pumping source and actuator. Refer to data sheet I-286-S for selection of hydraulic fluids.

H. Adjustments

The only cartridge valves that have an adjustment are the units with the stroke adjustment feature. Stroke adjusters limit the insert poppet travel and act as a flow regulator in the circuit. In general, adjusting the orifice sizes in the valve cover will not be required since the system is tuned during the design phase.

I. Product Life

The service life of this product is dependent upon environment, duty cycle, operating parameters,

Reliable operation throughout the specified operating range is assured only if genuine Vickers parts are used. Sophisticated design processes and material are used in the manufacture of our parts. Substitutions may result in early failure.

J. Replacement Parts

and system cleanliness. Since these parameters vary from application to application, the ultimate user must determine and establish the periodic maintenance requirements to maximize life and detect potential component failure.

SECTION VII - OVERHAUL & PARTS INFORMATION

WARNING

Before breaking a circuit connection, make sure that power is off and system pressure is released. Lower all vertical cylinders, discharge accumulators, and block any load that could generate pressure.

CAUTION

Absolute cleanliness is essential when working on a hydraulic system. Always work in a clean area. The presence of dirt and foreign materials in the system can result in serious damage or inadequate operation.

NOTE

Discard and replace all o-rings, gaskets, and back-up rings removed during disassembly.

A. Service Tools

The following service tools are required to overhaul a cartridge valve.

1. A torque wrench with hex bit adapters. Refer to Table 9 for appropriate torque wrench values.

Table 9. Torque Requirements

Cover	Size	N.m	lb.ft.
Mounting Screw			
16mm	35	26	
25mm	110	80	
32mm	285	210	
40mm	500	370	
50mm	580	430	
63mm	1200	890	

2. A set of U.S.A. and metric hex key wrenches
3. A set of small pin punches
4. A 3/8 inch ratchet with sockets
5. A small ball peen hammer
6. A 1 inch micrometer
7. A suitable piece of hardwood or nylon block to install sleeve
8. A suitable extractor tool to remove insert poppet and sleeve

B. Cartridge Cover Disassembly & Assembly

1. Perform the following steps:
 - i. Locate the appropriate cover assembly figure number from the following listing (page 22 & 23). Refer to exploded view drawings 18 through

NOTE

Cover assemblies that have an NFPA-D03 interface were formally designated as NFPA-D01. Cover assemblies that have an NFPA-D05 interface were formally designated as NFPA-D02.


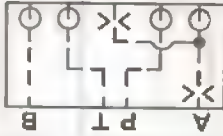
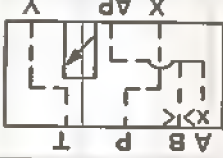
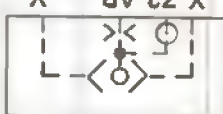
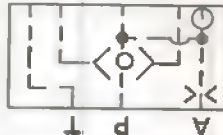
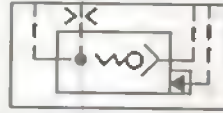


NOTE

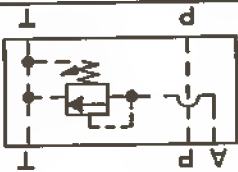
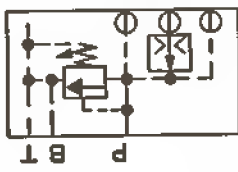
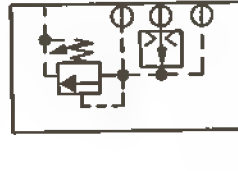
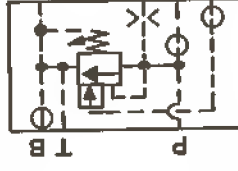
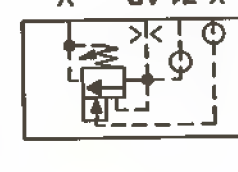
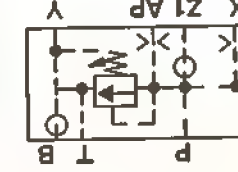
If a complete cover assembly is required, obtain a new cover assembly by the model code that is stamped on the cover nameplate.

Table 10. Orifice Kits

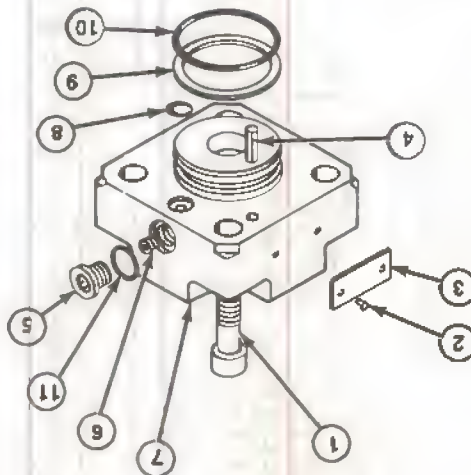
* Included in Orifice Kit			
* Orifice Kit	* 926281	* 926282	* 926283
Solid Plug	* 35633	* 812	* 675169
	5.4		675958
	3.2	691279	
	3.0	730464	635180
	2.7	730463	
	2.5	635161	
	2.3	635142	
	2.0	675991	635179
	1.8	675990	* 635178
	1.7	635160	
	1.6	691050	* 635177
Grey 1.5	* 635141	* 635159	* 635176
Brown 1.4	635140	* 635158	
Violet 1.3	635139	* 635157	
Orange 1.2	* 635138	* 635156	* 635175
Pink 1.1	635137	635155	
Yellow 1.0	* 635136	* 635154	* 635174
Purple 0.9		* 635153	
Blue 0.8	635135	635152	* 635173
Green 0.7	* 635134	* 635151	
White 0.6	635133	635150	
Red 0.5	635132	635149	
Size	16	25/32/40	50/63
Color/	Valve Size (mm)		

- 27 when ordering replacement parts.
2. If required, remove the pilot valve from top of cover assembly.
3. Remove the cover from the manifold block
4. Disassemble the cover according to item number sequence order.
5. Inspect the cover parts for damage or excessive wear. Make sure all orifices are open and free from dirt. If a new orifice plug is required, refer to Table 10 and obtain an orifice kit. Orifices have been redesigned from a screwdriver slot to hex head.

Parts No. Figure No.	Cover Type	Functional Symbol	Cover Assembly Model Code
18	Directional with Locknut Adj.		CVC-**-N-S2-10
	Directional with Micrometer Adj.		CVC-**-A-S2-W-10
	Directional with Micrometer/key Adj.		CVC-**-A-S2-M-10 CVC-**-A-S2-K-10
20	Directional with NFA-D03 Interface (D1 Function Shown)		CVC-**-D1-S2-10
	Directional with NFA-D05 Interface		CVC-**-D2-S2-10
21	Directional with NFA-D03 Interface & Locknut Adj. (NC-Normally Open Function Shown)		CVC-**-AD1-S2-W-10-NC CVC-**-AD1-S2-W-10-NO
22	Shuttle		CVC-**-W-S2-10
23	Shuttle with NFA-D03 Interface (W11 Function Shown)		CVC-**-W11-S2-10
23a	Shuttle with NFA-D03 Interface (W31)		CVC-**-W21-S2-10 CVC-**-W31-S2-10
24	Pilot Operated Check		CVC-**-PC-S2-10
25	Pressure Relief with Locknut Adj.		CVC-**-C-S2-W-***-10
	Pressure Relief with Micrometer Adj.		CVC-**-C-S2-M-***-10
	Pressure Relief with Micrometer/Key		CVC-**-C-S2-K-***-10
25	Pressure Relief with NFA-D03 Interface & Locknut Adj.		CVC-**-C1-S2-W-***-10
	Pressure Relief Interface & Micrometer Adj.		CVC-**-C1-S2-M-***-10

<p>> < - Standard orifice location ○ - Tapped port for installation of an additional orifice</p>			
28	Pressure Relief Module		CVCG-3-***-10
27	Pressure Reducing with NFPA-D03 Interface & Micrometer/key Adj.		CVC-**-X1-S2-K-***-10
	Pressure Reducing with NFPA-D03 Interface & Locknut Adj.		CVC-**-X1-S2-M-***-10
	Pressure Reducing with NFPA-D03 Interface & Locknut Adj.		CVC-**-X1-S2-W-***-10
27	Pressure Reducing with Micrometer/key Adj.		CVC-**-X-S2-K-***-10
	Pressure Reducing with Micrometer Adj.		CVC-**-X-S2-M-***-10
	Pressure Reducing with Locknut Adj.		CVC-**-X-S2-W-***-10
26	Unloading with NFPA-D03 Interface & Micrometer/key Adj.		CVC-**-U1-S2-K-***-10
	Unloading with NFPA-D03 Interface & Micrometer Adj.		CVC-**-U1-S2-M-***-10
	Unloading with NFPA-D03 Interface & Locknut Adj.		CVC-**-U1-S2-W-***-10
26	Unloading with Micrometer/key Adj.		CVC-**-U-S2-K-***-10
	Unloading with Micrometer Adj.		CVC-**-U-S2-M-***-10
	Unloading with Locknut Adj.		CVC-**-U-S2-W-***-10
25	Pressure Relief with NFPA-D03 Interface & Micrometer/key Adj.		CVC-**-C1-S2-K-***-10

CVC-**-N-S2-10



NOTE
Bolt kit not included
in cover assembly.

Figure 18. Directional Cover Assembly (N Function)

Item No.	Part Description	Size (mm)			
		18	25	32	40
1	Bolt Kit - inch	590700	590704	590713	590706
	- mm	590701	590705	590718	590707
	Torque to (lb. ft.)	(26)	(80)	(210)	(370)
2	Screw (2 Req'd)	36212	36212	36212	36212
3	Nameplate	199082	199082	199082	199082
4	Roll Pin	168319	226797	226797	195940
5	Plug	398071	398071	398071	315932
	Torque to (lb. ft.)	(7.4)	(7.4)	(7.4)	(22)
* 6	Orifice Plug (Std.)	635136	635156	635157	635177
7	Cover	580013	580056	730408	580094
8	O-Ring	262330	262331	262332	262334
9	Back-up Ring	277652	277707	277712	277716
10	O-Ring	262360	262401	262406	262410
11	O-Ring	263492	263492	263492	263496

Note: 1 lb. ft. = .74 Nm.

▲ - Included in seal kit (Table 13)

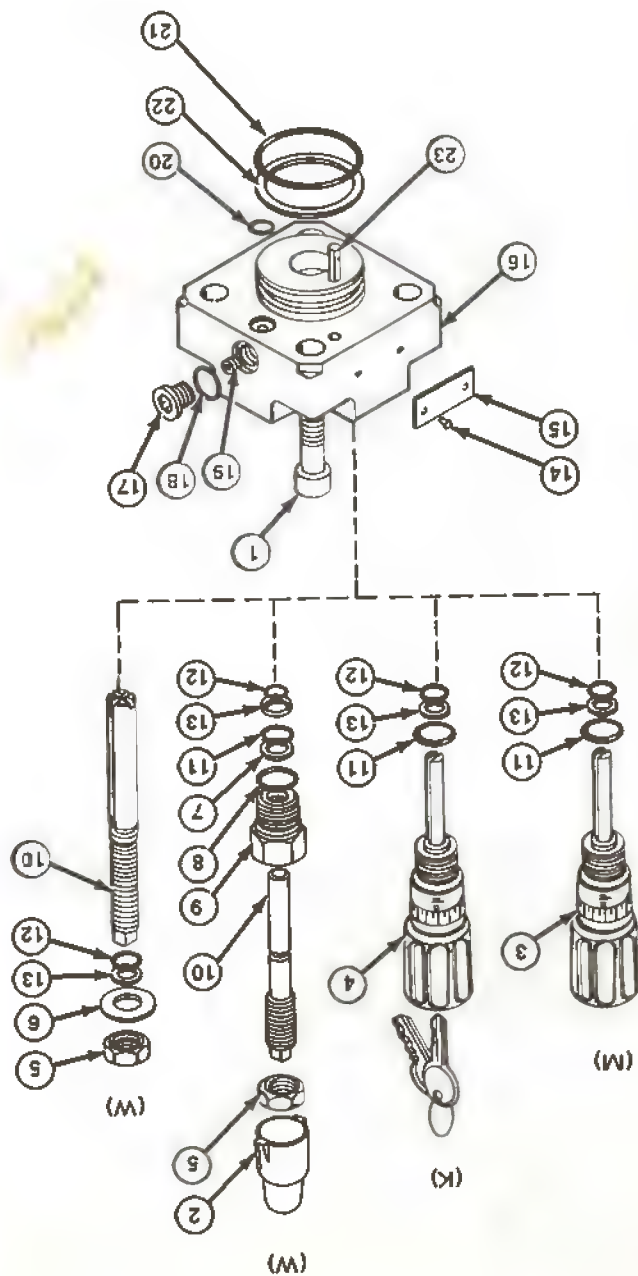
■ - Not available for sale

* - Refer to Table 10 for other orifice sizes

Figure 18. Parts Tabulation

Figure 19. Directional Cover Assembly with Stroke Adjuster (A Function)

NOTE
Bolt kit not included
in cover assembly.



CVC-**-A-S2--10

Figure 19. Parts Tabulation

- ▲ - Included in seal kit (Table 13)
- ◆ - Included in adjuster rod kit 941472 (16, 25mm only)
- * - Refer to Table 10 for other orifice sizes
- - Not available for sale

Note: 1 lb. ft. = .74 Nm.

Item No.	Part Description	Valve Size (mm)				
		16	25	32	40	50
1	Bolt Kit - inch	590700	590704	590713	590706	590708
	- mm	590701	590705	590718	590707	590709
	Torque to (lb. ft.)	(26)	(80)	(210)	(370)	(430)
2	Cap	762607	762607	762607	762607	762607
3	Micrometer S/A (M)	637458	637460	637461	637461	637461
4	Micrometer/key S/A (K)	637459	637461	637461	637461	637461
5	Lock Nut	761190	761190	688469	761190	763770
6	Washer	—	—	688471	763690	763726
7	Adaptor	579922	579922	579922	579922	579922
	Torque to (lb. ft.)	(81)	(81)	(81)	(81)	(81)
8	Circlip	762487	762487	762487	762487	762487
9	Retaining Ring	762488	762488	762488	762488	762488
10	Adjuster Rod	764458	764459	730407	579926	589151
11	O-Ring	262355	262355	262355	262355	262355
12	O-Ring	262350	262350	262349	262350	262390
13	Back-up Ring	197588	197588	197587	197588	197628
14	Screw (2 Req'd)	36212	36212	36212	36212	36212
15	Nameplate	199082	199082	199082	199082	199082
16	Cover	580014	580057	730409	580095	589108
17	Plug	398071	398071	398071	398071	315932
	Torque to (lb. ft.)	(7.4)	(7.4)	(7.4)	(7.4)	(22)
18	O-Ring	263492	263492	263492	263492	263496
19	Orifice (Std.)	635136	635156	635157	635158	635177
20	O-Ring	262330	262331	262332	262334	262334
21	O-Ring	262360	262401	262406	262410	262467
22	Back-up Ring	277652	277707	277712	277716	277781
23	Roll Pin	168319	226797	226797	226797	195940

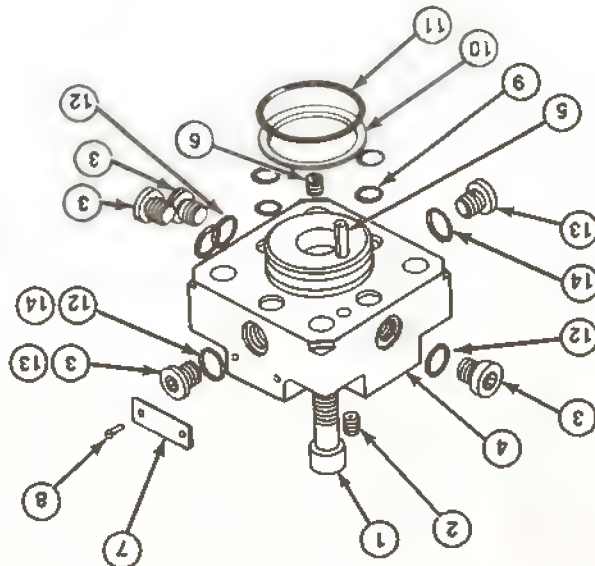
Figure 20. Parts Tabulation

Note: 1 lb. ft. = .74 Nm.
 ▲ - Included in seal kit (Table 13)
 ■ - Not available for sale
 * - Refer to Table 10 for other orifice sizes

Item No.	Part Description	16	25	32	40	50	63
1	Bolt Kit - 1/2 inch - mm	590700	590704	590713	590706	590708	590710
	Torque to (lb. ft.)	(26)	(80)	(210)	(370)	(430)	(890)
* 2	Orifice (Std.)	635136	635156	635157	635158	---	---
3	Plug (Qty.)	398071 (4)	398071 (4)	398071 (4)	398071 (4)	315932 (3)	315932 (3)
	Torque to (lb. ft.)	(7.4)	(7.4)	(7.4)	(7.4)	(22)	(22)
■ 4	Cover (NFA-D03)	730705	580058	730410	580096	---	---
	Cover (NFA-D05)	---	---	---	---	589107	589130
5	Roll Pin	168319	226797	226797	226797	195940	195940
* 6	Orifice (Std.)	---	---	---	---	635177	635178
7	Nameplate	199082	199082	199082	199082	199082	199082
8	Screw (2 Req'd)	36212	36212	36212	36212	36212	36212
▲ 9	O-Ring (4 Req'd)	262330	262331	262332	262334	262334	262354
▲ 10	Back-up Ring	277652	277707	277712	277716	277781	277790
▲ 11	O-Ring	262360	262401	262406	262410	262467	262476
▲ 12	O-Ring	263492	263492	263492	263492	263496	263496
13	Plug (2 Req'd)	---	---	---	---	343740	343740
	Torque to (lb. ft.)	---	---	---	---	(11)	(11)
▲ 14	O-Ring	---	---	---	---	263494	263494

Valve Size (mm)

Figure 20. Directional Cover Assembly with NFA-D03 / NFA-D05 Interface (D1 & D2 Function)



CVC--D1-S2-10
 CVC--D2-S2-10

NOTE
 Bolt kit not included
 in cover assembly.

▲ - Included in seal kit (Table 13)
 * - Not available for sale
 - Refer to Table 10 for other orifice sizes

Figure 21. Parts Tabulation

Item No.	Part Description	Valve Size (mm)
1	Bolt Kit - inch	25
	Torque to (lb. ft.)	40
2	Cap	590704 590705 590706
3	Micrometer S/A (M)	762607 (81) (370)
4	Micrometer/key S/A (K)	730236
5	Lock Nut	761190
6	Washer	761192
7	Adaptor	579922
8	Circlip	762487
9	Retaining Ring	762488
10	Adjuster Rod	730128
11	O-Ring	262355
12	O-Ring	262350
13	Back-up Ring	197588 197588

Item No.	Part Description	Valve Size (mm)
14	Cover	684793 684798
15	O-Ring	262401 262410
16	Back-up Ring	277707 277716
17	O-Ring (2 Req'd)	262331 262334
18	Plug (2 Req'd)	398071
19	Torque to (lb. ft.)	7.4
20	Plug (NO) @ A Port	812
21	Orifice (NO) @ B Port	635156 635158
20	Plug (NC) @ B Port	812
21	Orifice (NC) @ A Port	635156 635158
22	Roll Pin	226797 226797
23	Screw (2 Req'd)	36212 36212
24	Nameplate	199082 199082

Figure 21. Directional Cover Assembly with NFPA-D03 Interface and Stroke Adjuster (AD1 Function)

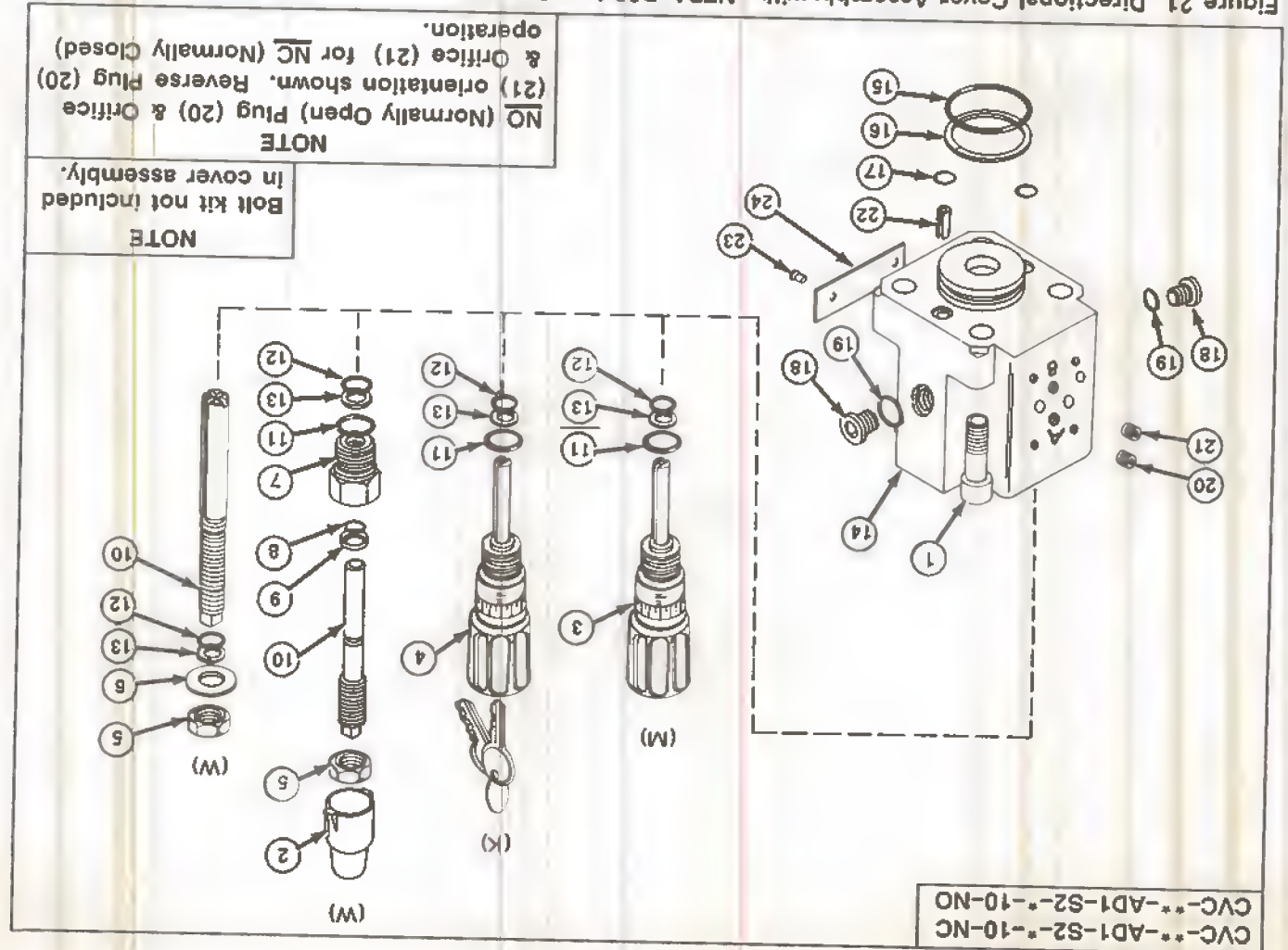


Figure 22. Parts Tabulation

Note: 1 lb. ft. = .74 Nm.
 ▲ - Included in seal kit (Table 13)
 ■ - Not available for sale
 * - Refer to Table 10 for other orifice sizes
 ⊖ - Do Not Remove

Item No.	Part Description	16	25	32	40
1	Bolt Kit - inch	590700	590704	590713	590706
	- mm	590701	590705	590718	590707
	Torque to (lb. ft.)	(28)	(81)	(210)	(370)
2	Screw (2 Req'd)	36212	36212	36212	36212
3	Nameplate	199082	199082	199082	199082
4	Plug	—	—	398071	398071
	Torque to (lb. ft.)	—	—	(7.4)	(7.4)
5	O-Ring	—	—	263492	263492
6	Plug	398071	398071	398071	398071
	Torque to (lb. ft.)	(7.4)	(7.4)	(7.4)	(7.4)
7	O-Ring	263492	263492	263492	263492
8	Cover	580016	580060	730412	580098
9	Back-up Ring	277652	277707	277712	277716
10	O-Ring	262360	262401	262406	262410
11	O-Ring (3 req'd)	262330	262331	262332	262334
12	Roll Pin	168319	226797	226797	226797
13	Orifice (Std.)	635136	635156	635157	635158
13a	Solid Plug	—	—	812	812
14	Plug	315932	315932	315932	315932
	Torque to (lb. ft.)	(22)	(22)	(22)	(22)
15	O-Ring	263496	263496	263496	263496
16-21	See Figure 22	16, 25, 32, 40mm			

Figure 22. Shuttle Cover Assembly (W Function)

NOTE
Bolt kit not included in cover assembly.

CVC-**-W-S2-10

Item No.	Part Description	Part No.
16	Plug	760881
	Torque (lb. ft.)	(75)
17	USIT Ring	763633
18	Back-up Ring	580550
19	O-ring	262333
20	Ball	1651
21	Seat	760882

Figure 23. Parts Tabulation

Item No.	Part Description	Valve Size (mm)			
		16	25	32	40
1	Bolt Kit - Inch	690700	590704	590713	590706
	- mm	690701	590705	590718	590707
	Torque to (lb. ft.)	(26)	(81)	(210)	(370)
2	Screw (2 Req'd)	36212	36212	36212	36212
3	Nameplate	199082	199082	199082	199082
4	Cover	730850	580062	730413	580100
5	Plug (Qty.)	398071 (4)	398071 (5)	398071 (4)	398071 (4)
	Torque to (lb. ft.)	(7.4)	(7.4)	(7.4)	(7.4)
6	O-Ring (Qty.)	263492 (4)	263492 (5)	263492 (4)	263492 (4)
	Plug	---	---	---	---
	Torque to (lb. ft.)	---	---	---	---
8	O-Ring	---	---	---	---
9	Plug	---	---	---	---
*	Orifice (Std.)	635136	635156	635157	635158
11	Plug	Omit	812	812	812
12	O-Ring (4 Req'd)	262330	262331	262332	262334
13	O-Ring	262360	262401	262406	262410
14	Back-up Ring	277652	277707	277712	277716
15	Roll Pin	168319	226797	226797	226797
16	Plug	760881	760881	760881	760881
	Torque to (lb. ft.)	(75)	(75)	(75)	(75)
17	USIT Ring	763633	763633	763633	763633
18	Back-up Ring	580550	580550	580550	580550
19	O-Ring	262333	262333	262333	262333
20	Ball	1651	1651	1651	1651
21	Seat	760882	760882	760882	760882

Note: 1 lb. ft. = .74 Nm.
 ▲ - Included in seal kit (Table 13)
 ■ - Not available for sale
 * - Refer to Table 10 for other orifice sizes.
 ⊕ - Do Not Remove

Item No. 9 Plug

Cover	mm	Bottom Plug	Top Plug
Type W1	16	Out	35633
Type W21	32	Out	812
Type W1	25	Out	812
Type W21	40	Out	812

Figure 23. Shuttle Cover Assembly with NFPA-D03 Interface (W1 & W21 Function)

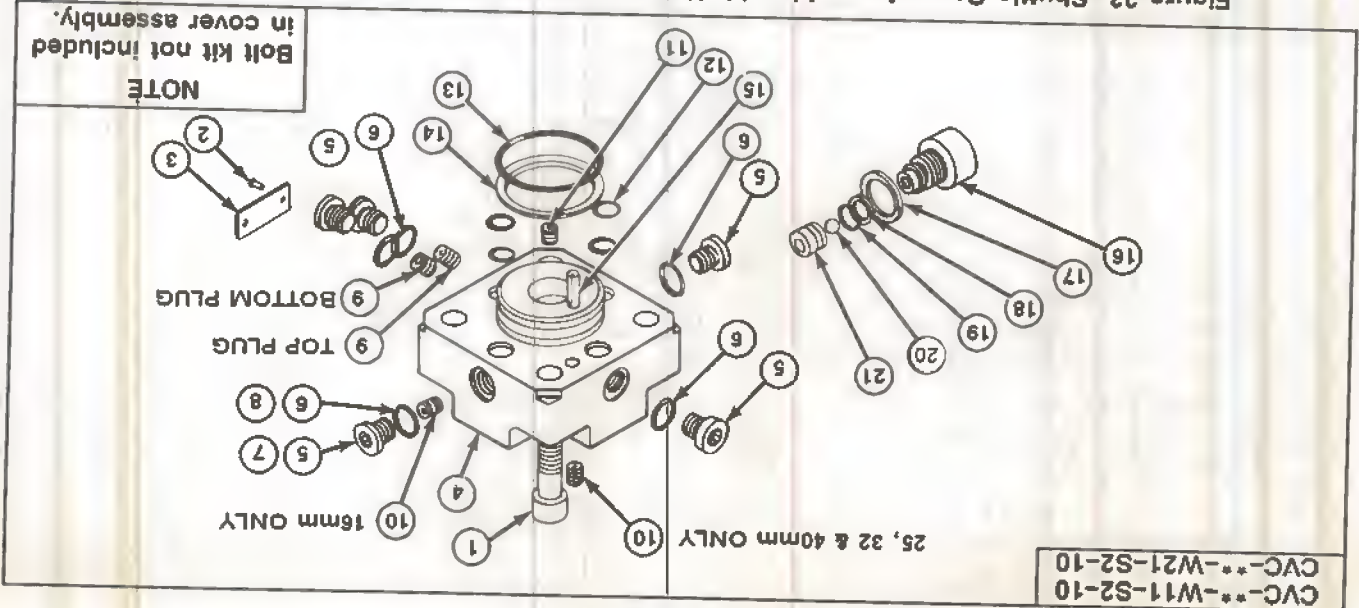
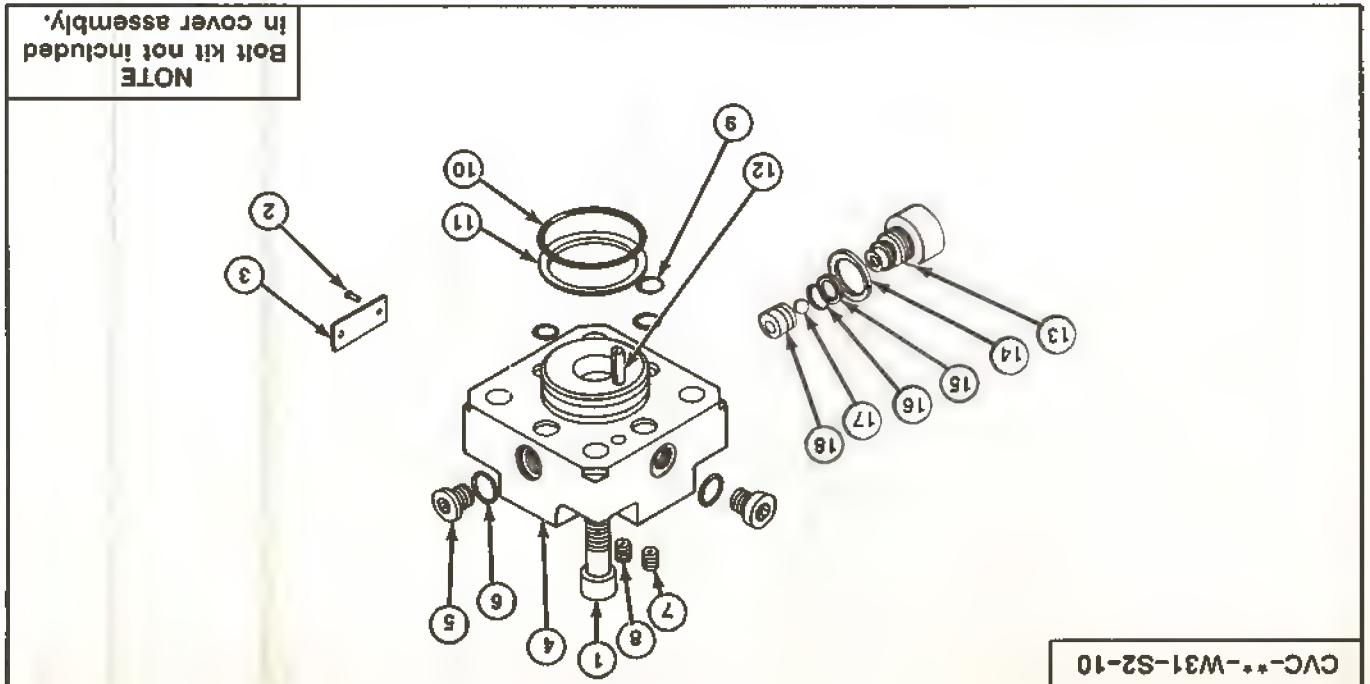


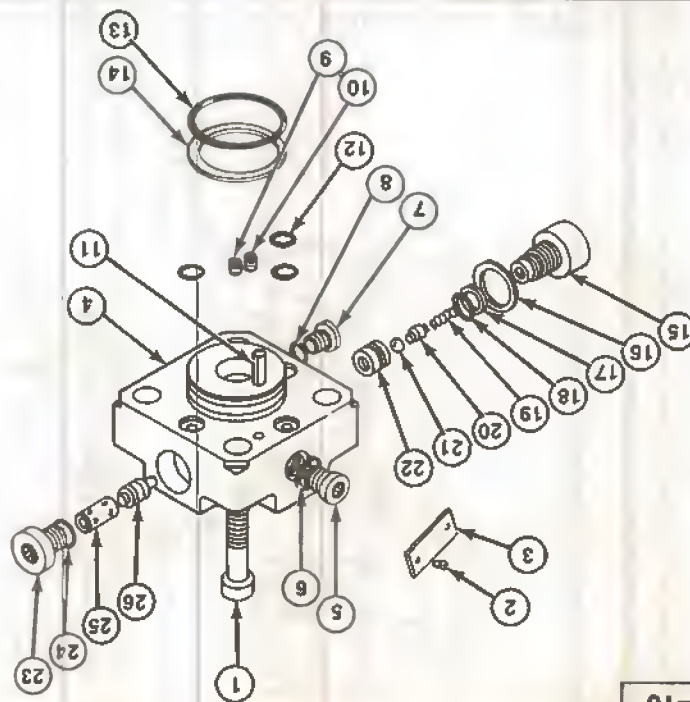
Figure 23a. Parts Tabulation

Note: 1 lb. ft. = .74 Nm.
 ▲ - Included in seal kit (Table 13)
 ■ - Not available for sale
 * - Refer to Table 10 for other orifice sizes.

Item No.	Part Description	16	25	32	40
1	Bolt Kit - inch	590700	590704	590713	590706
	- mm	590701	590705	590718	590707
2	Torque to (lb. ft.)	(26)	(81)	(210)	(370)
	Screw (2 Req'd)	36212	36212	36212	36212
3	Nameplate	199082	199082	199082	199082
4	■ Cover	517261	477104	476657	477368
5	Plug (Qty.)	398071(1)	398071(2)	398071(2)	398071(2)
	Torque to (lb. ft.)	(7.4)	(7.4)	(7.4)	(7.4)
▲ 6	O-Ring (Qty.)	263492(1)	263492(2)	263492(2)	263492(2)
7	Plug (@ 'B')	35633	812	812	812
* 8	Orifice (Std.) (@ 'A')	635136	635156	635157	635158
▲ 9	O-Ring (3 Req'd)	262330	262331	262332	262334
▲ 10	O-Ring	262360	262401	262406	262410
▲ 11	Back-up Ring	277652	277707	277712	277716
12	Roll Pin	168319	226797	226797	226797
13	Plug	760881	760881	760881	760881
	Torque to (lb. ft.)	(75)	(75)	(75)	(75)
▲ 14	USIT Ring	763633	763633	763633	763633
▲ 15	Back-up Ring	580550	580550	580550	580550
▲ 16	O-Ring	262333	262333	262333	262333
17	Ball	1651	1651	1651	1651
18	Seat	760882	760882	760882	760882

Figure 23a. Shuttle Cover Assembly with NFPA-D03 Interface (W31 Function)





NOTE
Bolt kit not included
in cover assembly.

Figure 24. Pilot Operated Check Cover Assembly (PC Function)

Item No.	Part Description	Valve Size (mm)	Item No.	Part Description	Valve Size (mm)
1	Bolt Kit - inch	16	25	Plug	16-40
	Torque to (lb. ft.)	590701	26	Spacer (40mm)	760881
	- mm	590705		Spacer (32mm)	760882
2	Screw (2 Req'd)	36212		Spacer (25mm)	760883
	Torque to (lb. ft.)	(26)		Spacer (16mm)	760884
		(80)		Omit	760885
3	Nameplate	199082		24 O-Ring	263492
4	Cover	580017		Torque (lb. ft.)	(22)
5	Plug	398071		23 Plug	315932
	Torque to (lb. ft.)	(7.4)		22 Seat	760882
6	O-Ring	263492		21 Ball	1651
	Torque to (lb. ft.)	(7.4)		20 Spool	760889
7	Plug	398071		19 Spring	544103
	Torque to (lb. ft.)	(7.4)		18 O-Ring	262333
8	O-Ring	263492		17 Back-up Ring	580550
	Torque to (lb. ft.)	(7.4)		16 USIT Ring	763633
9	Office (Std.)	635156		Torque (lb. ft.)	(75)
10	Plug	812		15 Plug	760881
11	Roll Pin	168319			
12	O-Ring (3 Req'd)	262330			
13	O-Ring	262360			
14	Back-up Ring	277652			
	Note: 1 lb. ft. = .74 Nm.				
	▲ - Included in seal kit (Table 13)				
	■ - Not available for sale				
	* - Refer to Table 10 for other orifice sizes				
	⊖ - Do not remove.				

Figure 24. Parts Tabulation

Figure 25. Parts Tabulation

Item No.	Part Description	16	25	32	40
1	Bolt Kit - inch	590702	590704	590713	590706
	- mm	590703	590705	590718	590707
	Torque to (lb. ft.)	(26)	(80)	(210)	(370)
2	Cap	762607	762607	762607	762607
3	Lock Nut	761190	761190	761190	761190
4	Adjusting Rod	762918	762918	762918	762918
5	Adaptor	579922	579922	579922	579922
	Torque to (lb. ft.)	(75)	(75)	(75)	(75)
6	Keys (1 set of 2)	814573	814573	814573	814573
7	Micrometer/key S/A (K)	637463	637463	637463	637463
8	Micrometer S/A (M)	637462	637462	637462	637462
9	O-Ring	262335	262335	262335	262335
10	O-Ring	262350	262350	262350	262350
11	Back-up Ring	197588	197588	197588	197588
12	Guide	762919	762919	762919	762919
13	Shims	762920	762920	762920	762920
14	Spring (125 bar)	762928	762928	762928	762928
	Spring (245 bar)	762929	762929	762929	762929
	Spring (350 bar)	762930	762930	762930	762930
15	Washer	762921	762921	762921	762921
16	Poppet	290057	290057	290057	290057

Figure 25. Pressure Relief Cover Assembly (C & C1 Function)

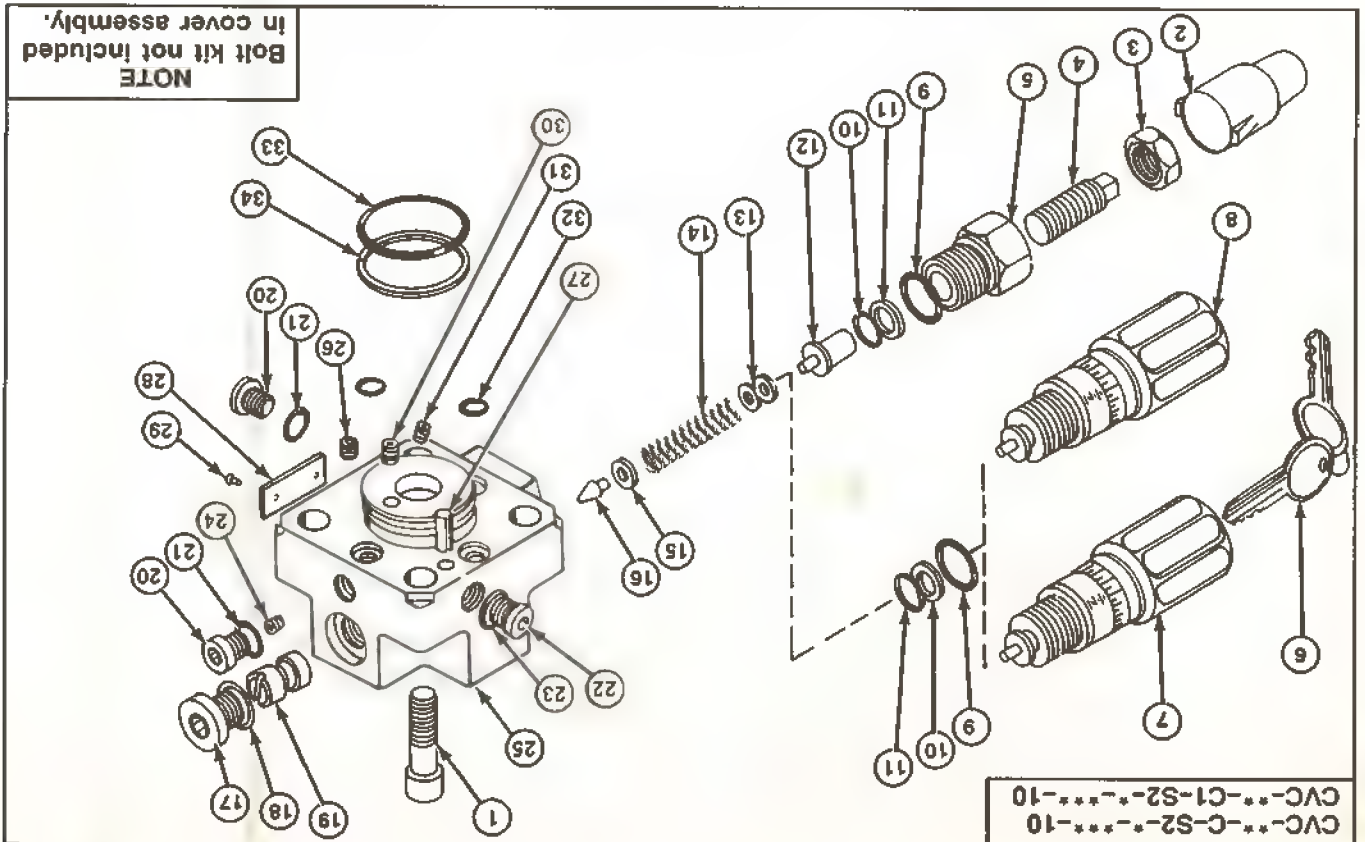


Figure 25. Parts Tabulation (Continued)

- Note: 1 lb. ft. = .74 Nm.
14.5 psi = 1 bar
- ▲ - Included in seal kit (Table 13)
 - - Not available for sale
 - * - Refer to Table 10 for other orifice sizes
 - ◆ - Included in adjuster rod kit 941472
 - - Included in poppet kit 941473
 - ⊖ - Do Not Remove

Item No.	Part Description	Valve Size (mm)			
		16	25	32	40
17	Plug	329463	329463	329463	329463
	Torque to (lb. ft.)	(42)	(42)	(42)	(42)
▲ 18	O-Ring	263497	263497	263497	263497
● 19	Seat	762922	762922	762922	762922
20	Plug	398071	398071	398071	398071
	Torque to (lb. ft.)	(7.4)	(7.4)	(7.4)	(7.4)
▲ 21	O-Ring	263492	263492	263492	263492
22	Plug	398071	398071	398071	398071
	Torque to (lb. ft.)	(7.4)	(7.4)	(7.4)	(7.4)
23	O-Ring	263492	263492	263492	263492
* 24	Orifice (Std)	635154	635154	635154	635154
■ 25	Cover (Type C)	579982	580266	731077	580327
	Cover (Type C1)	730455	580265	731078	580326
* 26	Orifice (Std)	635135	635152	635153	
27	Roll Pin	168319	226797	226797	226797
28	Nameplate	199082	199082	199082	199082
29	Screw (2 Req'd)	36212	36212	36212	36212
⊖ 30	Plug	—	—	—	812
* 31	Orifice (Std)	635138	635156	635158	635159
▲ 32	O-Ring (3 Req'd)	262330	262331	262332	262334
▲ 33	O-Ring	262360	262401	262406	262410
▼ 34	Back-up Ring	277652	277707	277712	277716

Figure 26. Parts Tabulation

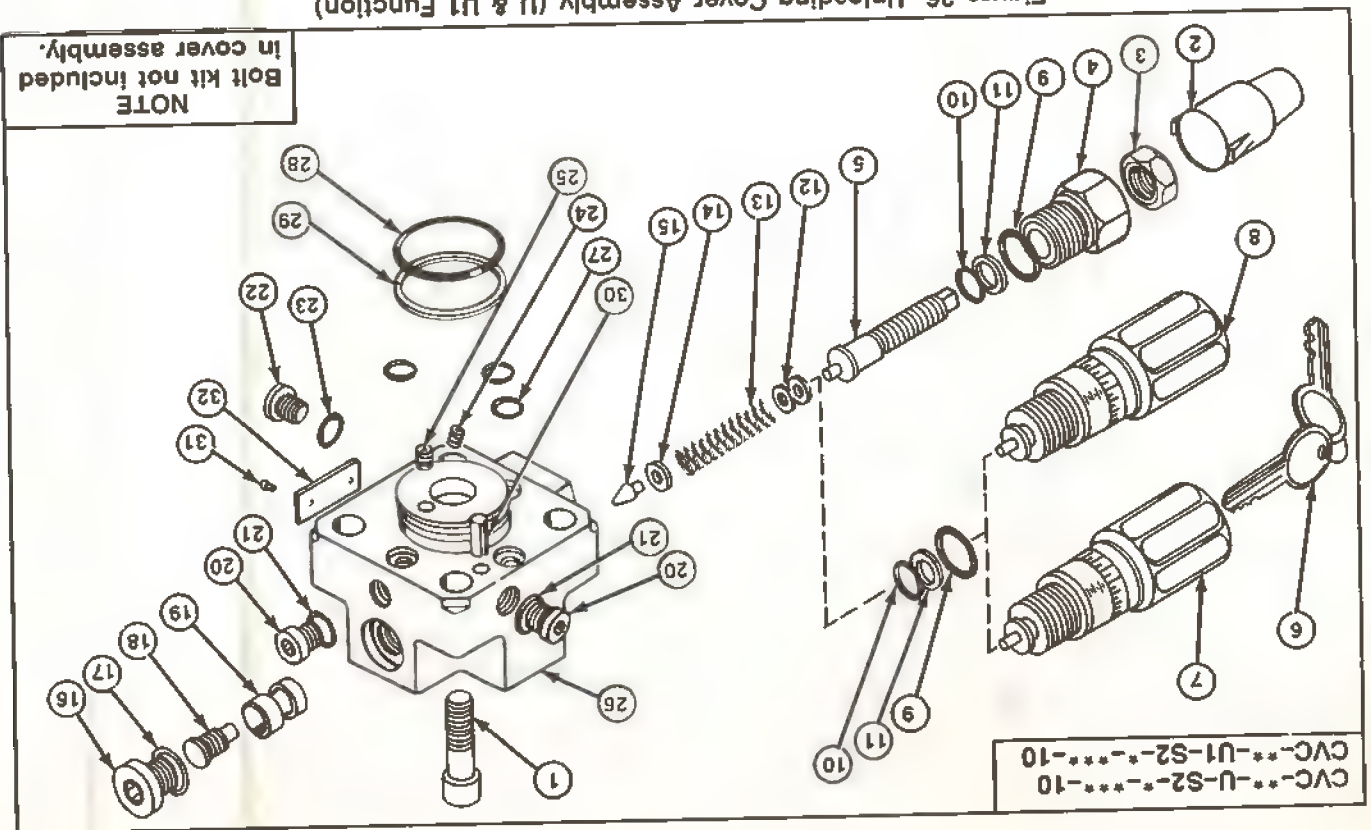
Item No.	Part Description	Valve Size (mm)			
		16	25	32	40
2	Cap	762607	590704	590713	590706
3	Lock Nut	764177	590706	590718	590707
4	Adaptor Torque to (lb. ft.)	679692	(26)	(60)	(370)
5	Adjusting Rod Torque to (lb. ft.)	764176	(26)	(60)	(370)
6	Keys (1 set of 2)	814573	(26)	(60)	(370)
7	Micrometer/Key S/A (K)	637463	(26)	(60)	(370)
8	Micrometer S/A (M)	637462	(26)	(60)	(370)
9	O-Ring	262355	(26)	(60)	(370)
10	O-Ring	262350	(26)	(60)	(370)
11	Back-up Ring	197588	(26)	(60)	(370)
12	Shims	762920	(26)	(60)	(370)
13	Spring (125 bar)	762928	(26)	(60)	(370)
	Spring (245 bar)	762929	(26)	(60)	(370)
	Spring (350 bar)	762930	(26)	(60)	(370)
14	Washer	762921	(26)	(60)	(370)
15	Poppet	290057	(26)	(60)	(370)
16	Plug Torque to (lb. ft.)	329463	(26)	(60)	(370)
17	O-Ring	263497	(26)	(60)	(370)
18	Plunger	815031	(26)	(60)	(370)
19	Seat	815030	(26)	(60)	(370)
20	Plug Torque to (lb. ft.)	398071	(26)	(60)	(370)
21	O-Ring	263492	(26)	(60)	(370)

Item No.	Part Description	Valve Size (mm)			
		16	25	32	40
1	Bolt Kit - Inch	590702	590704	590713	590706
	- mm	590703	590706	590718	590707
22	Plug Torque to (lb. ft.)	(26)	(60)	(210)	(370)
	Torque to (lb. ft.)	(26)	(60)	(210)	(370)
23	O-Ring	(26)	(60)	(210)	(370)
24	Plug	(26)	(60)	(210)	(370)
25	Orifice (Standard)	635138	635156	635157	635158
26	Cover (Type U)	579982	580266	731077	580327
	Cover (Type U)	730455	680265	731078	580326
27	O-Ring (3 Req'd)	262330	262331	262332	262334
28	O-Ring	262360	262401	262406	262410
29	Back-up Ring	277652	277707	277712	277716
30	Roll Pin	168319	226797	226797	226797
31	Screw (2 Req'd)	36212	36212	36212	36212
32	Nameplate	199082	199082	199082	199082

Note: 1 lb. ft. = .74 Nm.
14.5 psi = 1 bar.

▲ - Included in seal kit (Table 13)
 ● - Included in poppet kit
 ■ - Not available for sale
 ⊖ - Do Not Remove
 * - Refer to Table 10 for other orifice sizes

Figure 26. Unloading Cover Assembly (U & U1 Function)



Item No.	Part Description	Valve Size(mm)
1	Bolt Kit - inch	25
	Torque to (lb. ft.)	590702 590704
	- mm	590703 590705
2	Cap	762607 762607
3	Lock Nut	764177 764177
4	Adaptor	579692 579692
5	Adjuster Rod	764176 764176
6	O-Ring	262350 262350
7	Back-up Ring	197588 197588
8	O-Ring	262355 262355
9	Micrometer/key S/A (K)	637463 637463
10	Keys (1 set of 2)	814573 814573
11	Micrometer (M)	637642 637642
12	Shims	762920 762920
13	Spring (125 bar)	762928 762928
	Spring (245 bar)	762929 762929
	Spring (350 bar)	762930 762930
14	Washer	762921 762921

Note: 1 lb. ft. = .74 Nm.
14.5 psi = 1 bar

▲ - Included in seal kit (Table 13)

- ◆ - Included in poppet kit 926288
- ◆ - Included in adjuster rod kit 926227
- - Not available for sale

Item No.	Part Description	Valve Size(mm)
15	Poppet	290057 290057
16	Plug	579921 579921
	Torque to (lb. ft.)	(42) (42)
17	O-Ring	263497 263497
18	Spool	764172 764172
19	Spring	544103 544103
20	Seal	764171 764171
21	Plug	398071 398071
	Torque to (lb. ft.)	(7.4) (7.4)
22	O-Ring	263492 263492
23	Cover (Type X)	579982 580266
	Cover (Type X1)	730455 580266
24	Roll Pin	168319 226797
25	Screw (2 Req'd)	36212 36212
26	Nameplate	199082 199082
27	O-Ring (3 Req'd)	262330 262331
28	O-Ring	262360 262401
29	Back-up Ring	271732 271787

Figure 27. Parts Tabulation

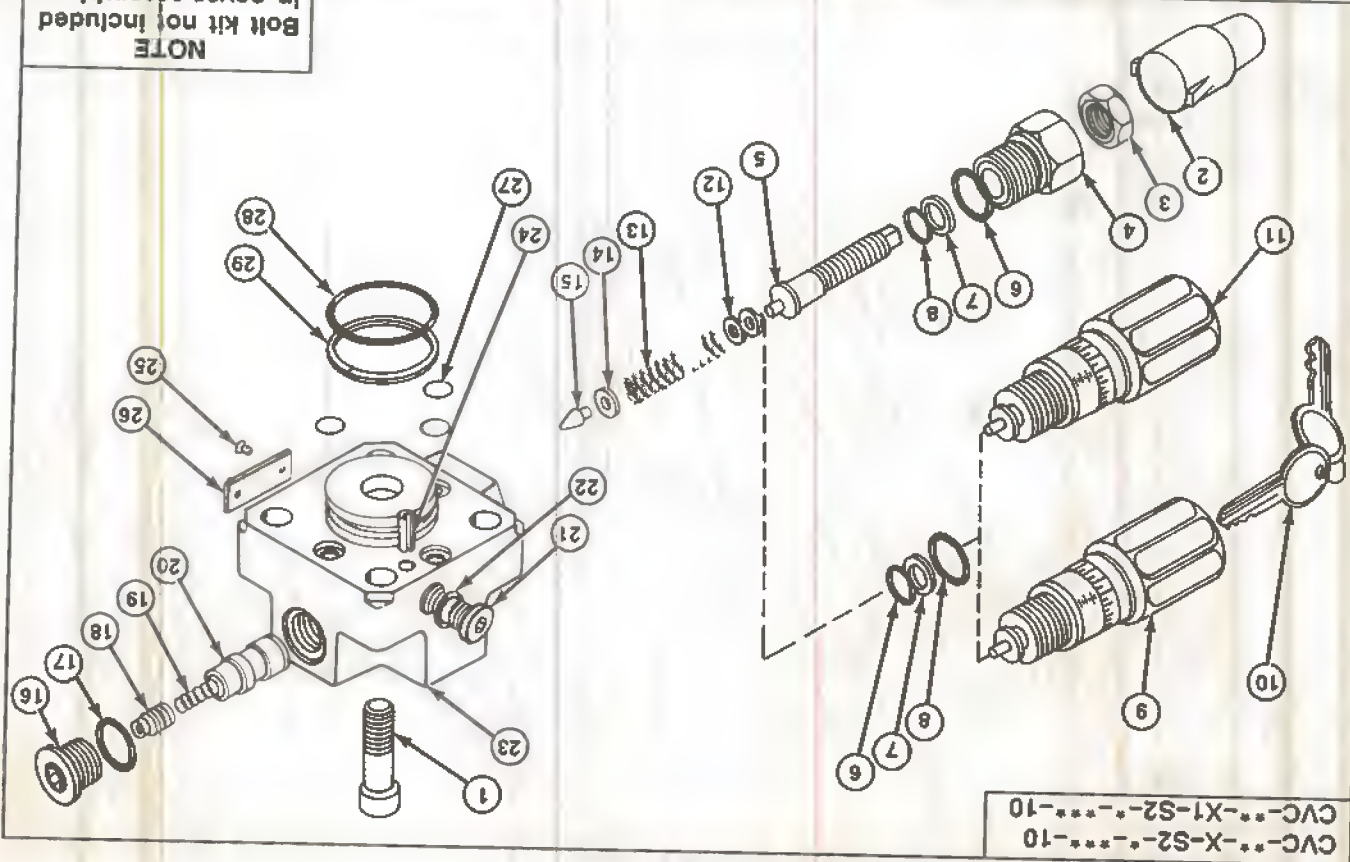


Figure 28. Parts Tabulation

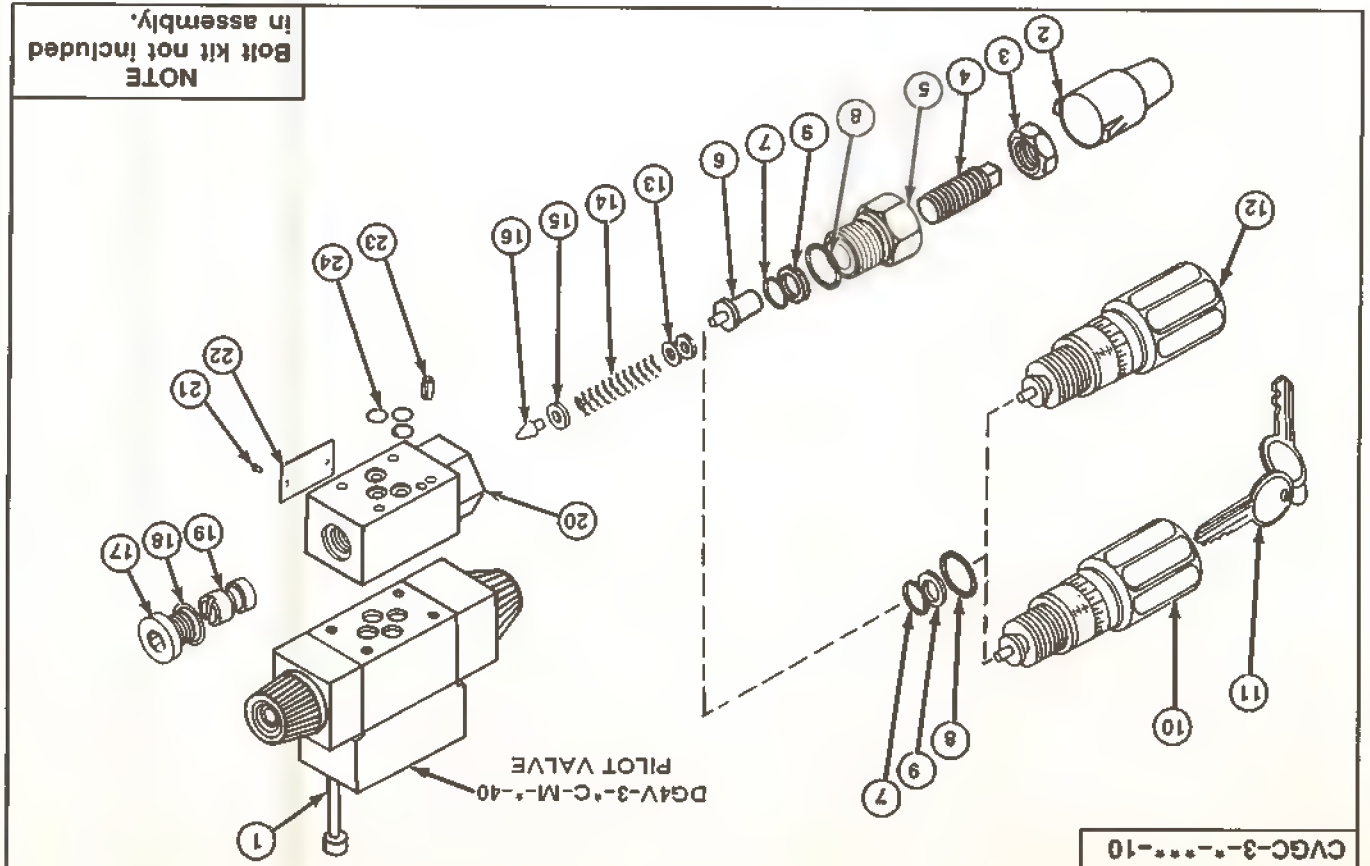
Item No.	Part Description	Part No.	Item No.	Part Description	Part No.
1	Bolt kit (See Appendix)	762607	14	Spring (125 bar)	762928
2	Cap	761190	15	Spring (250 bar)	762929
3	Lock Nut	762918	16	Spring (350 bar)	762930
4	Adjuster Rod	579922	17	Washer	762921
5	Adaptor	762919	18	Poppet	329463
6	Guide	762919	19	Plug	290057
7	Torque to (lb. ft.)	(81)	20	Torque to (lb. ft.)	(42)
8	O-Ring	262350	21	O-Ring	263497
9	Back-up Ring	262355	22	Seat	762922
10	Micrometer/key S/A (K)	197588	23	Body	580036
11	Keys (1 set of 2)	637463	24	Screw (2 req'd)	36212
12	Micrometer (M)	814573		Nameplate	199082
13	Shims	637462		Pin	472553

Note: 1 lb. ft. = .74 Nm.
14.5 psi = 1 bar

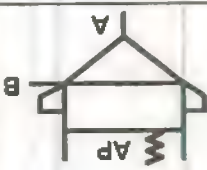
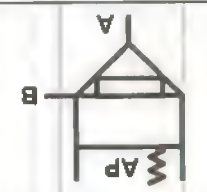
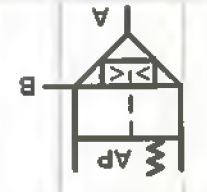
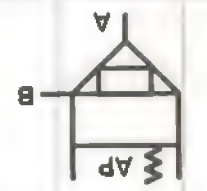
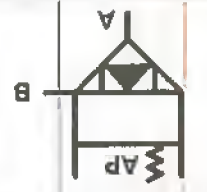
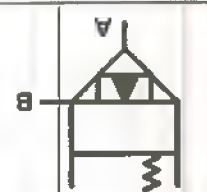
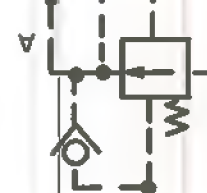
- ▲ - Included in seal kit 920258
- ◆ - Included in adjuster rod kit 941472
- - Included in poppet kit 941473
- - Not available for sale

Note:
To obtain a complete
CVGC module, order
by the model code on
the nameplate.

Figure 28. CVGC Pressure Relief Module



C. Cartridge Insert Disassembly & Assembly

Figure Number	Insert Type	Function	Functional Symbol	Insert Model Code
31	Directional	D10		CVI--D10-2-**- CVI--D10-2-L-**- CVI--D10-2-M-**- CVI--D10-2-H-**- CVI--D104-2-**-**
31	Directional	D11		CVI--D11-2-L-**- CVI--D11-2-M-**- CVI--D11-2-H-**-
31	Directional with Orifice	D11		CVI--D11-2-L-**- CVI--D11-2-M-**- CVI--D11-2-H-**-
31	Directional	D20		CVI--D20-2-L-**- CVI--D20-2-M-**- CVI--D20-2-H-**-
31	Restrictor	R		CVI--R-2-L-**- CVI--R-2-M-**- CVI--R-2-H-**-
31	Flow Control	F		CVI--F-2-L-**- CVI--F-2-M-**- CVI--F-2-H-**-
32	Pressure Reducing	X		CVI--X1-2-**-

1. Remove insert spring and determine the spring cracking pressure. Refer to Section V-C for instructions.
2. Use a suitable extractor and remove the poppet from the sleeve. Apply the extractor tool at the poppet groove as shown in Figure 29.

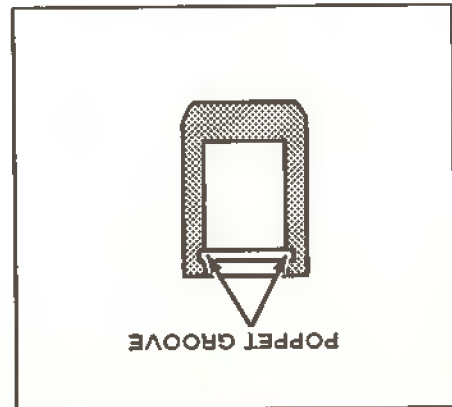


Figure 29. Insert Poppet

3. Determine poppet area ratio. Refer to Section V-C (Figure 17) for instructions.
4. Remove the sleeve from the manifold block. Apply a suitable extractor tool at the groove on smaller valve size (16mm through 32mm) pressure reducing inserts, or at the port holes for other inserts. See Figure 30. Apply the extractor tool to the two tapped holes on larger valve sizes (40mm through 63mm). See Figure 30a.

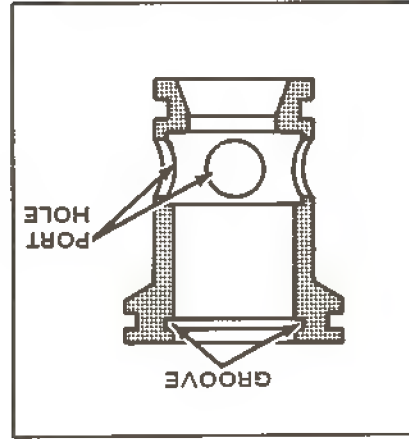
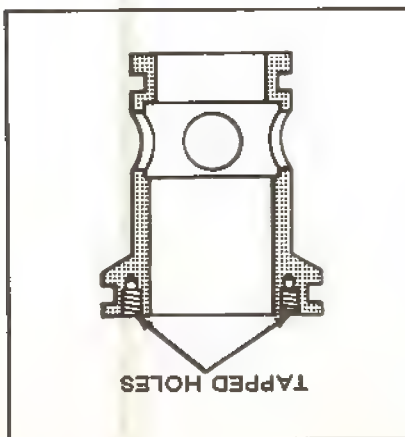


Figure 30a. Insert Sleeve
(40, 50, 63mm)

5. Determine valve size by measuring largest diameter of sleeve. Refer to the number/letter code stamped on the sleeve or Section V-C.
6. Remove o-rings and back-up rings from sleeve.
7. Inspect insert parts for damage or excessive wear.
8. If required, obtain a new insert kit from Table 11. The insert kit contains a new sleeve, poppet, spring, and seals for the sleeve.
9. Refer to Table 12 if a new insert spring is required.
10. If a new insert kit is not required, obtain a new seal kit from table 13 and install o-rings and back-up rings on the sleeve. The seal kit includes all necessary seals for the sleeve and the cover assembly). Refer to Figure 16 for seal orientation.
11. Lubricate the seals with clean hydraulic fluid. Orient the sleeve port holes with the port holes inside the manifold block. Install the sleeve into the manifold block with a suitable piece of aluminum or nylon.
12. Install the poppet into sleeve.
13. Install the spring into poppet.

Figure 30. Insert Sleeve
(16, 25, 32mm)



Note: 14.5 psi = 1 bar
 * - Use on pressure relief applications that exceed 3600 psi (250 bar).
 Table 11. Inset Kits

Area Ratio	Crack Press. (psi)	Insert Kit Number					Model Code Insert
		16mm	25mm	32mm	40mm	50mm	63mm
1:1	33.4	995105					CVI--D10-2-11
1:1	33.4		995298		995144		CVI--D10-2-30
1:1	40.6			995080			CVI--D10-2-11
1:1.1	4.3	580019	580064	815250	589229	589111	CVI--D11-2-L-10
1:1.1	20.3			815241			CVI--D11-2-M-10
1:1.1	24.7	580020	580065		580026	589112	CVI--D11-2-H-10
1:1.1	36.3	580021	580066		579931	589113	CVI--D11-2-M-10
1:1.1	39.2			815242			CVI--D11-2-H-10
1:2	7.3	580022	580067	815243	579932	589114	CVI--D20-2-L-10
1:2	36.3	580023	580068	815244	579933	589115	CVI--D20-2-M-10
1:2	72.5	580024	580069		579934	589116	CVI--D20-2-H-10
1:2	4.3	580028	815249	579938			CVI--D11-2-L-10
1:1.1	20.3			815250			CVI--D11-2-M-10
1:1.1	24.7	580029	580074		579939		CVI--D11-2-H-10
1:1.1	36.3	580030	815251	579940			CVI--D11-2-M-10
1:2	7.3	580025	815246	579935	589117	589140	CVI--F-2-L-10
1:2	36.3	580026	815247	579936	589118	589141	CVI--F-2-M-10
1:2	72.5			579937	589119	589143	CVI--F-2-H-10
1:2	7.3	675987	676004	479142	676194	455998	CVI--R-2-L-10
1:2	36.3	675988	676005	479143	676195	455999	CVI--R-2-M-10
1:2	72.5	675989	676006	479144	676196	455997	CVI--R-2-H-10
1:1	3.8	995103	995109		995108		CVI--D10-2-L-10
1:1	21.7	455919	995110		995104		CVI--D10-2-M-10
1:1	32.8	995105	995298	995080	995144		CVI--D10-2-H-10
* 1:104	29.0		478545		478546		CVI--X-2-10
		580360	580421				CVI--D104-2-10

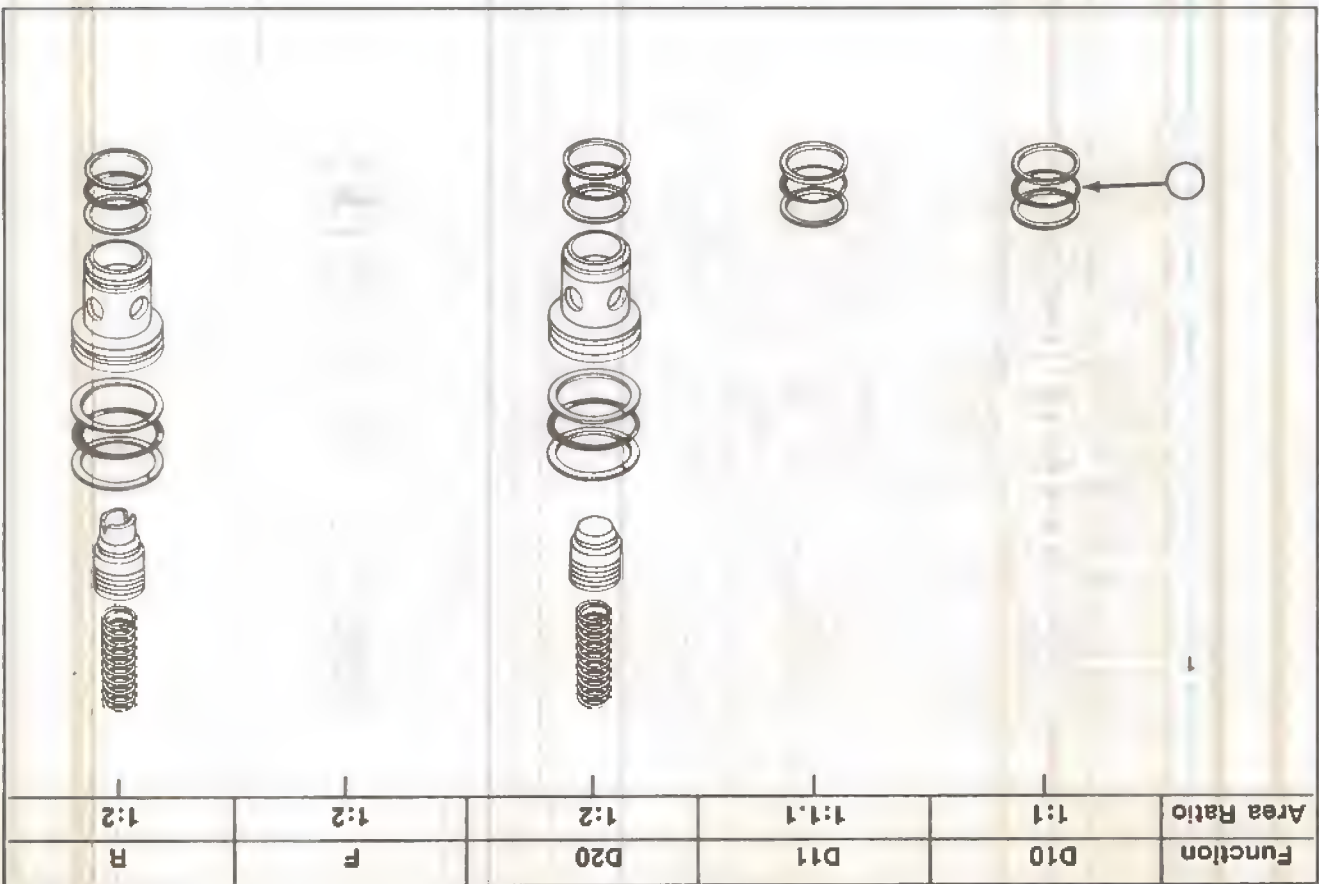
Table 13. Seal Kits

NOTE						
Replacement seal kits include F3 seals only. Kits include all necessary seals for cartridge insert and cartridge cover assembly on any type of cartridge valve. If a pilot valve is mounted on the cover assembly, refer to Table 3 and obtain the pilot valve seal kit (includes interface seals) from the pilot valve parts drawing.						
Valve Size (mm)	Seal Kit	920173	920175	920365	920177	920208
16	25	32	40	50	63	

Table 12. Insert Springs

Note: 14.5 psi = 1 bar

Area Ratio	Cracking Pressure (psi)	Valve Size/ Insert Spring					
		16mm	25mm	32mm	40mm	50mm	63mm
1:1	3.8 - 4.3	761564	761567	—	761570	—	—
	21.7	761565	761568	—	761571	—	—
	29.0 - 33.4	761566	761569	—	761572	—	—
	36.3	—	—	—	—	763676	—
1:1.04	40.6	—	—	815222	—	—	—
	4.3	761564	761567	815220	761570	763674	763712
	20.3	—	—	815221	—	—	—
	24.7	761565	761568	—	761571	763675	763713
1:1.1	36.3	761566	761569	—	761572	763676	763714
	39.2	—	—	815222	—	—	—
	7.3	761564	761567	815220	761570	763674	763712
	36.3	761565	761568	815221	761571	763675	763713
1:2	72.5	761566	761569	815222	761572	763676	763714



Item No.	Part Name	Function	Size(mm)	D10	D11	D20	F	R
1	Spring	16-63	See Table 12					
2	Poppet	16	994806	760970	760971	760974	987452	987452
		25	994807	760856	760857	760858	987677	987677
		32	995082	815232	815233	815234	479141	479141
		40	994808	760892	760894	760896	987678	987678
		50	479026	763671	763672	763673	637263	637263
		63	—	763709	763710	763711	637264	637264
		16	994809	580037	580038	580038	580038	580038
		25	994810	580078	580079	580079	580079	580079
		32	995801	815230	815231	815231	815231	815231
		40	994811	579942	579943	579943	579943	579943
		50	478953	589101	589102	589102	589102	589102
		63	—	589103	589104	589104	589104	589104
3	Sleeve	16	994809	580037	580038	580038	580038	580038
		25	994810	580078	580079	580079	580079	580079
		32	995801	815230	815231	815231	815231	815231
		40	994811	579942	579943	579943	579943	579943
		50	478953	589101	589102	589102	589102	589102
		63	—	589103	589104	589104	589104	589104

▲ - Included in seal kit (Table 13)
 ■ - Individual insert parts not available for sale.
 Obtain insert kit noted in Table 11.
 Figure 31. Cartridge Insert Parts for Directional, Shuttle & Pilot Operated Check

Figure 33. Cartridge Insert Parts for Pressure Reducing

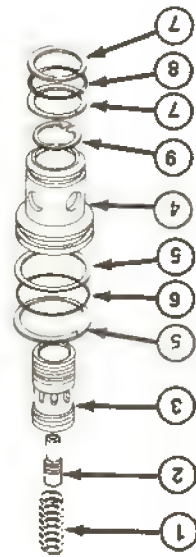


Figure 32. Cartridge Insert Parts for Pressure Relief & Unloading

Item No.	Part Name	Valve Size (mm)
1	Spring	16
2-⊖	Check Valve S/A	764166
3	Spool	764164
4	Sleeve	580366
5 ▲	Back-up Ring	277652
6 ▲	O-Ring	262360
7 ▲	Back-up Ring	277648
8 ▲	O-Ring	262356
9	Retaining Ring	922757
		103989

- ▲ - Included in seal kit (Table 13)
- - Individual insert parts not available for sale. Obtain insert kit noted in Table 11.
- ⊖ - Do not remove. Check valve S/A is bonded into spool with special compound.

- ▲ - Included in seal kit (Table 13)
- - Individual insert parts not available for sale.
- * - This office has metric threads.
Refer to European service drawings (Table 2) for other orifice sizes.

Item No.	Part Name	16	25	32	40
▲ 5	Back-up Ring	277652	277707	277712	277716
▲ 6	O-Ring	262360	262401	262406	262410
▲ 7	Back-up Ring	277648	277653	277707	277710
▲ 8	O-Ring	262356	262361	262401	262404

Item No.	Part Name	Office Dia. (mm)	Office (Std.)	Valve Size (mm)
40		16	986032	32
1.4		1.0	986037	1.2
815407			986037	815407

Item No.	Part Name	Size (mm)	Function		
1	Spring	16-40	See Table 12		
■ 2	Poppet	16	994806	—	761910
		25	994807	478543	761911
		32	995082	—	815236
		40	994808	478544	761912
■ 3	Sleeve	16	994809	—	580037
		25	994810	994810	580078
		32	995801	—	815230
		40	994811	994811	579942

Function	Area Ratio
D10	1:1
D104	1:1.04
D11	1:1.1 (w/Orifice)



APPENDIX

The following diagrams (Figures 34, 35 and 36) illustrate various cartridge valve arrangements and related bolt kits for cartridge valves with pilot valve interface covers.

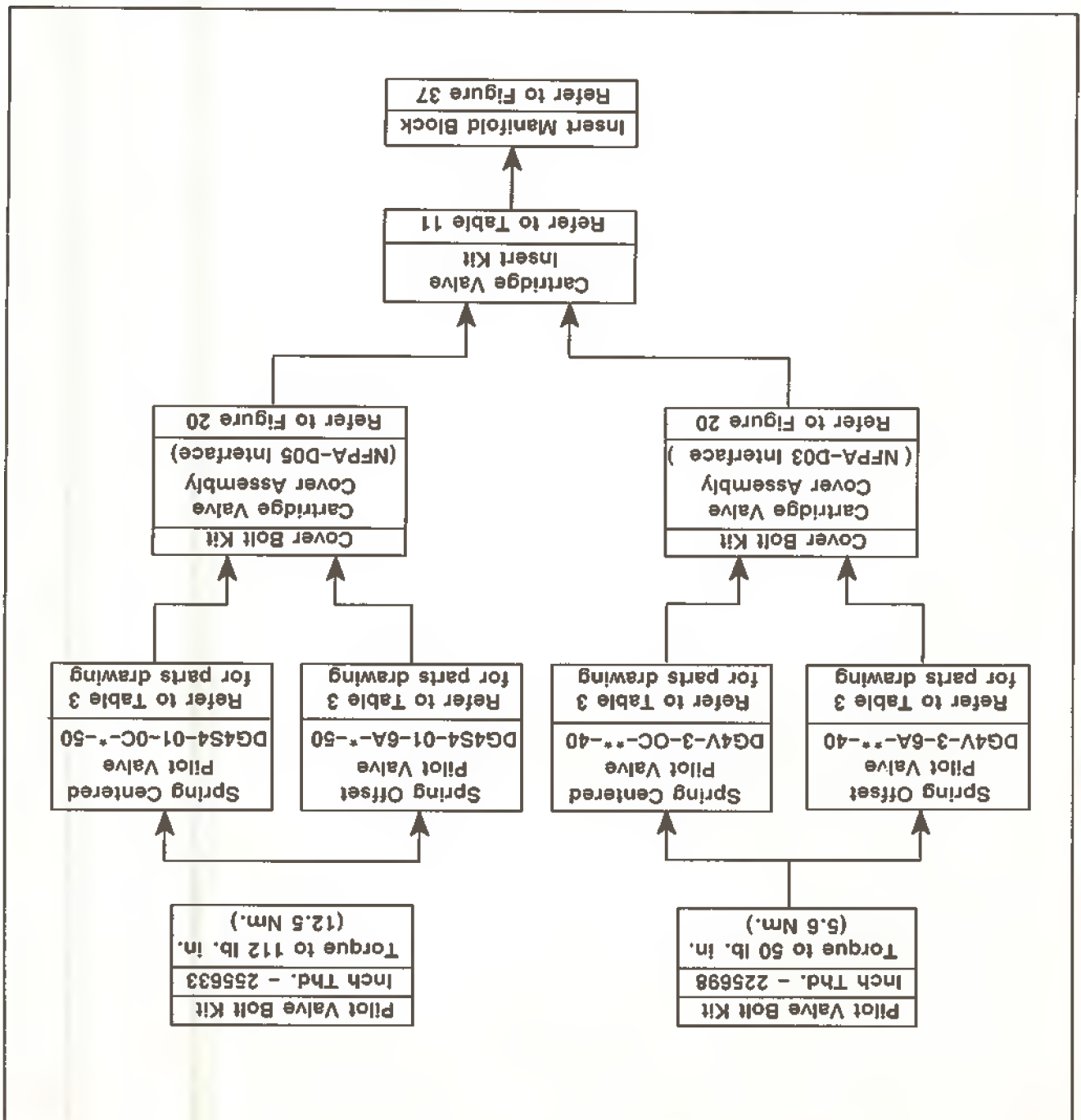


Figure 34. Cartridge Valve Arrangement for Directional Cover (NPPA-D03/D05)

Figure 35. Cartridge Valve Arrangement 1 for Pressure Relief Cover (NFA-D03)

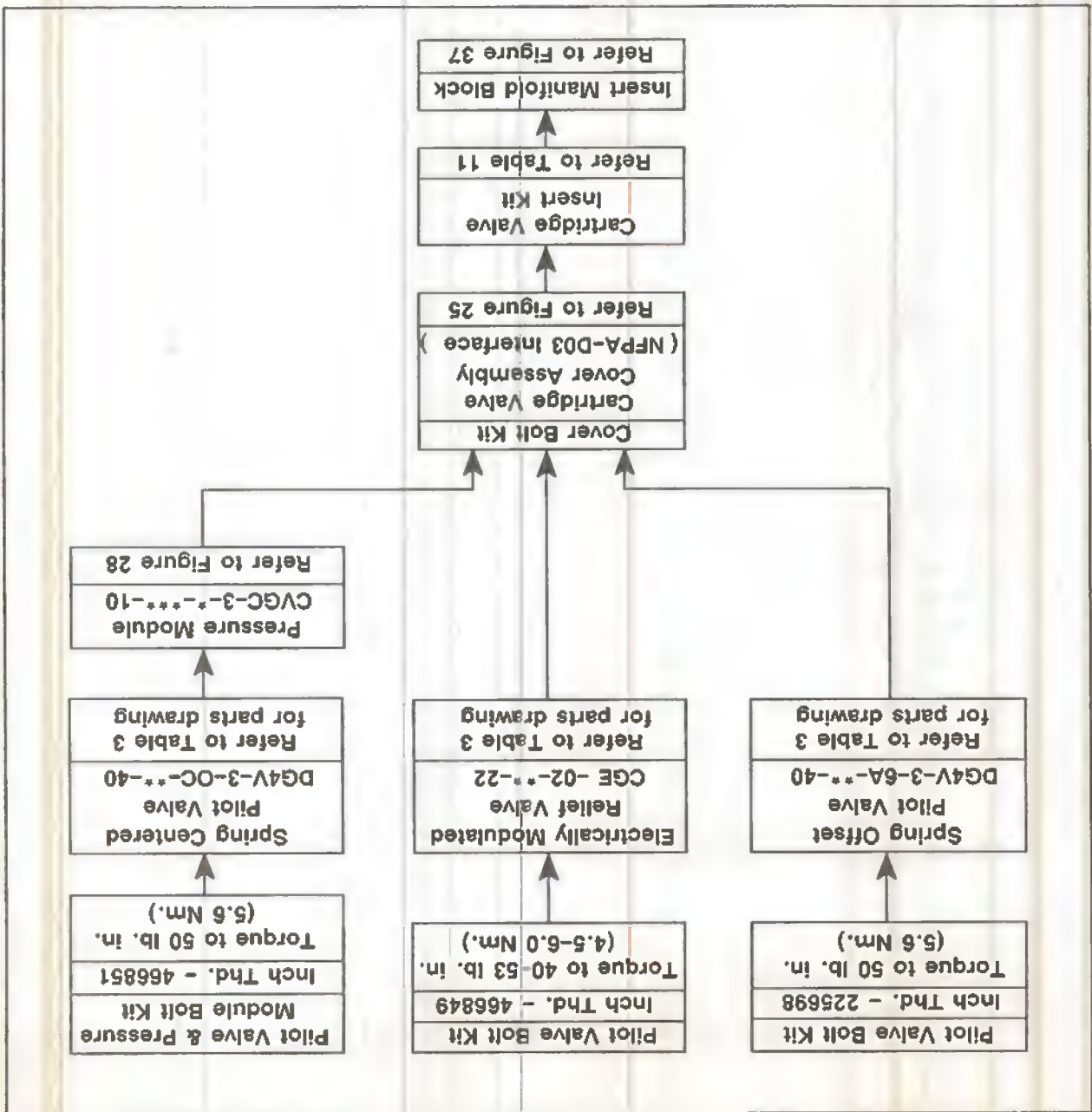
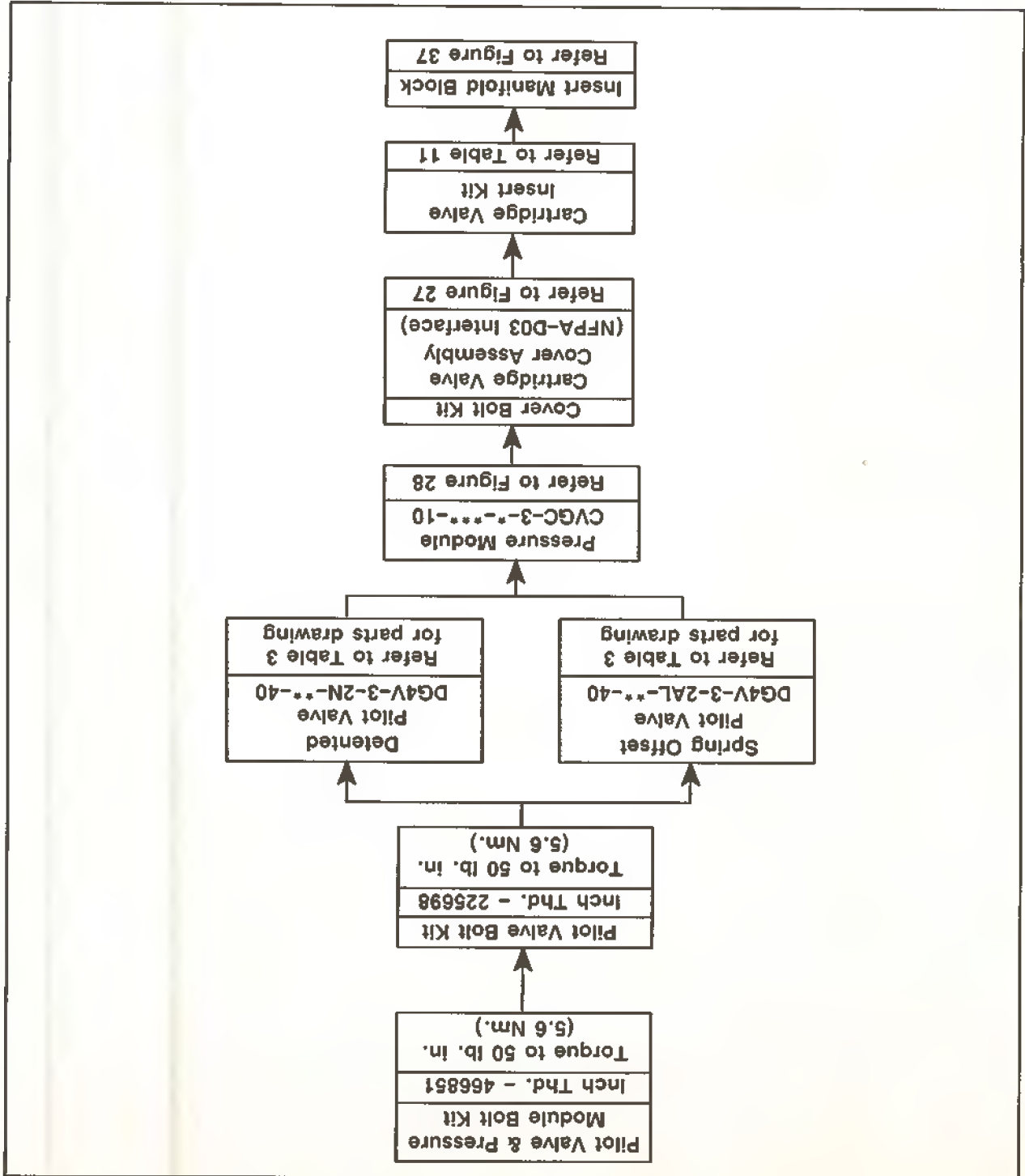


Figure 36. Cartridge Valve Arrangement for Pressure Reducing Cover (NFPA-D03)

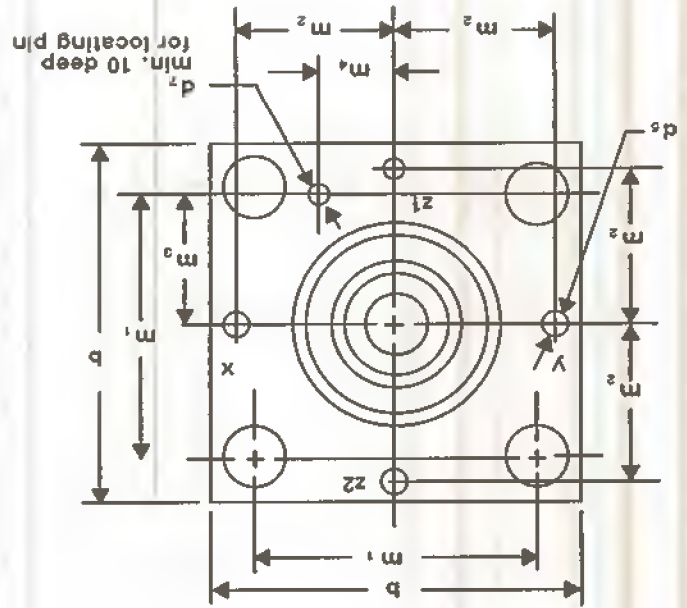


Manifold Block - Recess Dimensions to DIN 24342

Dimension Nominal Size - Metric (Inches)

Dimension	16mm	25mm	32mm	40mm	50mm	63mm
b	65(2.56)	85(3.35)	102(4.01)	125(4.92)	140(5.51)	160(7.09)
d ₁ min.	32.000(1.2598)	45.000(1.7717)	60.000(2.3622)	75.000(2.9528)	90.000(3.5433)	102.000(4.0157)
d ₂ min.	32.025(1.2608)	45.025(1.7726)	60.030(2.3633)	75.030(2.9539)	90.035(3.5447)	120.035(4.7258)
d ₂ max.	25.000(0.9843)	34.000(1.3386)	45.000(1.7716)	60.000(2.3622)	75.000(2.9528)	90.000(3.5433)
d ₂ min.	25.021(0.9851)	34.025(1.3395)	45.030(1.7727)	60.030(2.3633)	75.035(2.9543)	90.035(3.5447)
d ₃ max.	16(.63)	25(.98)	32(1.26)	40(1.57)	50(1.97)	63(2.48)
d ₄ min.	16(.63)	25(.98)	32(1.26)	40(1.57)	50(1.97)	63(2.48)
d ₅ max.	4(.157)	6(.236)	8(.314)	10(.393)	12(.472)	16(.63)
d ₆ max.	4(.157)	6(.236)	8(.314)	10(.393)	12(.472)	16(.63)
d ₇ + 0.2(+.008)	4.000(.1575)	6.000(.2362)	8.000(.3149)	10.000(.3936)	12.000(.4724)	16.000(.6311)
m ₁ + 0.2(+.008)	46(1.811)	58(2.284)	70(2.756)	85(3.347)	100(3.937)	125(4.921)
m ₂ + 0.2(+.008)	25(.984)	33(1.299)	41(1.614)	50(1.969)	62(2.481)	75(2.953)
m ₃ + 0.2(+.008)	23(.906)	29(1.142)	35(1.377)	42(1.674)	50(1.969)	62(2.481)
m ₄ + 0.2(+.008)	10.5(.414)	16(.630)	23(.906)	30(1.181)	38(1.535)	46(1.811)
t ₁ + 0.1(+.004)	43(1.692)	58(2.283)	70(2.755)	87(3.425)	100(3.937)	120(4.725)
t ₂ + 0.1(+.004)	56(2.204)	72(2.834)	86(3.346)	105(4.133)	122(4.803)	148(5.827)
t ₃	11(.433)	12(.472)	13(.511)	15(.590)	17(.669)	20(.787)
t ₄ to d ₄ max.	29.5(1.161)	40.5(1.594)	48(1.889)	58(2.322)	65.5(2.578)	77(3.031)
t ₅	20(.787)	30(1.181)	35(1.377)	40(1.574)	45(1.772)	50(1.969)
t ₆ Thd.	20(.787)	25(.984)	30(1.181)	35(1.377)	40(1.574)	45(1.772)
t ₇	2(.078)	2.5(.098)	3(.118)	3.5(.137)	4(.157)	5(.197)
t ₈	2(.078)	2.5(.098)	3(.118)	3.5(.137)	4(.157)	5(.197)
t ₉	1.5(.059)	2(.078)	2.5(.098)	3(.118)	3.5(.137)	4(.157)
t ₁₀ max.	25(.98)	31(1.220)	42(1.653)	53(2.086)	63(2.481)	75(2.953)
U	0.03(.0012)	0.03(.0012)	0.03(.0012)	0.05(.0020)	0.05(.0020)	0.05(.0020)
W	0.05(.0020)	0.05(.0020)	0.05(.0020)	0.05(.0020)	0.05(.0020)	0.05(.0020)
XRa						

* Depth of finish "XRa" in hole.



STANDARD ORIFICE LOCATIONS

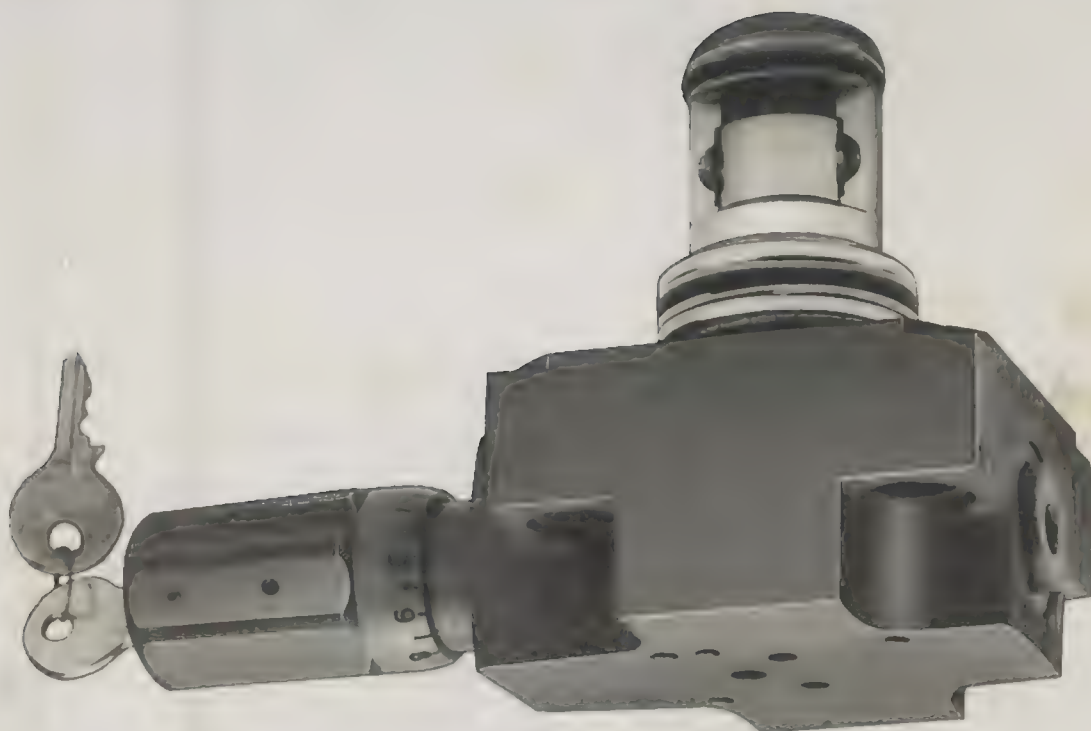
Example: XX = Office location not available - = Optional office location						
1.2 = Standard office (mm) location PLUG = Solid Plug						
CVC-16-A-S2-10	XX	XX	XX	XX	XX	XX
CVC-16-C1-S2-10	XX	XX	XX	XX	XX	XX
CVC-16-A-S2-10	XX	XX	XX	XX	XX	XX
CVC-16-C-S2-10	XX	XX	XX	XX	XX	XX
CVC-16-D1-S2-10	XX	XX	XX	XX	XX	XX
CVC-16-N-S2-10	XX	XX	XX	XX	XX	XX
CVC-16-PC-S2-10	XX	XX	XX	XX	XX	XX
CVC-16-U-S2-10	XX	XX	XX	XX	XX	XX
CVC-16-U1-S2-10	XX	XX	XX	XX	XX	XX
CVC-16-W-S2-10	XX	XX	XX	XX	XX	XX
CVC-16-W1-S2-10	XX	XX	XX	XX	XX	XX
CVC-16-W21-S2-10	XX	XX	XX	XX	XX	XX
CVC-16-W31-S2-10	XX	XX	XX	XX	XX	XX
CVC-16-X-S2-10	XX	XX	XX	XX	XX	XX
CVC-16-X1-S2-10	XX	XX	XX	XX	XX	XX
CVC-25-A-S2-10	XX	XX	XX	XX	XX	XX
CVC-25-C-S2-10	XX	XX	XX	XX	XX	XX
CVC-25-C1-S2-10	XX	XX	XX	XX	XX	XX
CVC-25-D1-S2-10	XX	XX	XX	XX	XX	XX
CVC-25-N-S2-10	XX	XX	XX	XX	XX	XX
CVC-25-PC-S2-10	XX	XX	XX	XX	XX	XX
CVC-25-U-S2-10	XX	XX	XX	XX	XX	XX
CVC-25-U1-S2-10	XX	XX	XX	XX	XX	XX
CVC-25-W-S2-10	XX	XX	XX	XX	XX	XX
CVC-25-W1-S2-10	XX	XX	XX	XX	XX	XX
CVC-25-W21-S2-10	XX	XX	XX	XX	XX	XX
CVC-25-W31-S2-10	XX	XX	XX	XX	XX	XX
CVC-25-X-S2-10	XX	XX	XX	XX	XX	XX
CVC-25-X1-S2-10	XX	XX	XX	XX	XX	XX
CVC-32-A-S2-10	XX	XX	XX	XX	XX	XX
CVC-32-C-S2-10	XX	XX	XX	XX	XX	XX
CVC-32-C1-S2-10	XX	XX	XX	XX	XX	XX
CVC-32-D1-S2-10	XX	XX	XX	XX	XX	XX
CVC-32-N-S2-10	XX	XX	XX	XX	XX	XX
CVC-32-PC-S2-10	XX	XX	XX	XX	XX	XX
CVC-32-U-S2-10	XX	XX	XX	XX	XX	XX
CVC-32-U1-S2-10	XX	XX	XX	XX	XX	XX
CVC-32-W-S2-10	XX	XX	XX	XX	XX	XX
CVC-32-W1-S2-10	XX	XX	XX	XX	XX	XX
CVC-32-W21-S2-10	XX	XX	XX	XX	XX	XX
CVC-32-W31-S2-10	XX	XX	XX	XX	XX	XX
CVC-40-AD1-S2-10-NC	1.4	XX	PLUG	XX	XX	XX
CVC-40-AD1-S2-W-10-NO	PLUG	XX	1.4	XX	XX	XX
CVC-40-A-S2-W-10	XX	XX	XX	XX	XX	XX
CVC-40-C-S2-10	XX	XX	XX	XX	XX	XX
CVC-40-C1-S2-10	XX	XX	XX	XX	XX	XX
CVC-40-D1-S2-10	XX	XX	XX	XX	XX	XX
CVC-40-N-S2-10	XX	XX	XX	XX	XX	XX
CVC-40-PC-S2-10	XX	XX	XX	XX	XX	XX
CVC-40-U-S2-10	XX	XX	XX	XX	XX	XX
CVC-40-U1-S2-10	XX	XX	XX	XX	XX	XX
CVC-40-W-S2-10	XX	XX	XX	XX	XX	XX
CVC-40-W1-S2-10	XX	XX	XX	XX	XX	XX
CVC-40-W21-S2-10	XX	XX	XX	XX	XX	XX
CVC-40-W31-S2-10	1.4	XX	PLUG	XX	XX	XX
CVC-40-AD1-S2-W-10-NC	"A"	"AP"	"B"	"X"	"Z1"	"Z2"
CVC-40-AD1-S2-W-10-NO	PLUG	XX	1.4	XX	XX	XX
CVC-40-A-S2-W-10	XX	XX	XX	XX	XX	XX
CVC-40-C-S2-10	XX	XX	XX	XX	XX	XX
CVC-40-C1-S2-10	XX	XX	XX	XX	XX	XX
CVC-40-D1-S2-10	XX	XX	XX	XX	XX	XX
CVC-40-N-S2-10	XX	XX	XX	XX	XX	XX
CVC-40-PC-S2-10	XX	XX	XX	XX	XX	XX
CVC-40-U-S2-10	XX	XX	XX	XX	XX	XX
CVC-40-U1-S2-10	XX	XX	XX	XX	XX	XX
CVC-40-W-S2-10	XX	XX	XX	XX	XX	XX
CVC-40-W1-S2-10	XX	XX	XX	XX	XX	XX
CVC-40-W21-S2-10	XX	XX	XX	XX	XX	XX
CVC-40-W31-S2-10	1.4	XX	PLUG	XX	XX	XX
CVC-50-A-S2-W-10	"A"	"AP"	"B"	"X"	"Z1"	"Z2"
CVC-50-A-S2-W-10	XX	XX	XX	XX	XX	XX
CVC-50-D2-S2-10	XX	XX	XX	XX	XX	XX
CVC-50-N-S2-10	XX	XX	XX	XX	XX	XX
CVC-50-PC-S2-10	XX	XX	XX	XX	XX	XX
CVC-50-U-S2-10	XX	XX	XX	XX	XX	XX
CVC-50-U1-S2-10	XX	XX	XX	XX	XX	XX
CVC-50-W-S2-10	XX	XX	XX	XX	XX	XX
CVC-50-W1-S2-10	XX	XX	XX	XX	XX	XX
CVC-50-W21-S2-10	XX	XX	XX	XX	XX	XX
CVC-50-W31-S2-10	1.4	XX	PLUG	XX	XX	XX
CVC-63-A-S2-W-10	"A"	"AP"	"B"	"X"	"Z1"	"Z2"
CVC-63-A-S2-W-10	XX	XX	XX	XX	XX	XX
CVC-63-D2-S2-10	XX	XX	XX	XX	XX	XX
CVC-63-N-S2-10	XX	XX	XX	XX	XX	XX
CVC-63-PC-S2-10	XX	XX	XX	XX	XX	XX
CVC-63-U-S2-10	XX	XX	XX	XX	XX	XX
CVC-63-U1-S2-10	XX	XX	XX	XX	XX	XX
CVC-63-W-S2-10	XX	XX	XX	XX	XX	XX
CVC-63-W1-S2-10	XX	XX	XX	XX	XX	XX
CVC-63-W21-S2-10	XX	XX	XX	XX	XX	XX
CVC-63-W31-S2-10	1.4	XX	PLUG	XX	XX	XX
CVC-63-AD1-S2-W-10-NO	PLUG	XX	1.4	XX	XX	XX
CVC-63-A-S2-W-10	XX	XX	XX	XX	XX	XX
CVC-63-C-S2-10	XX	XX	XX	XX	XX	XX
CVC-63-C1-S2-10	XX	XX	XX	XX	XX	XX
CVC-63-D1-S2-10	XX	XX	XX	XX	XX	XX
CVC-63-N-S2-10	XX	XX	XX	XX	XX	XX
CVC-63-PC-S2-10	XX	XX	XX	XX	XX	XX
CVC-63-U-S2-10	XX	XX	XX	XX	XX	XX
CVC-63-U1-S2-10	XX	XX	XX	XX	XX	XX
CVC-63-W-S2-10	XX	XX	XX	XX	XX	XX
CVC-63-W1-S2-10	XX	XX	XX	XX	XX	XX
CVC-63-W21-S2-10	XX	XX	XX	XX	XX	XX
CVC-63-W31-S2-10	1.4	XX	PLUG	XX	XX	XX
CVC-63-AD1-S2-W-10-NO	"A"	"AP"	"B"	"X"	"Z1"	"Z2"
CVC-63-AD1-S2-W-10-NO	PLUG	XX	1.4	XX	XX	XX
CVC-63-A-S2-W-10	XX	XX	XX	XX	XX	XX
CVC-63-C-S2-10	XX	XX	XX	XX	XX	XX
CVC-63-C1-S2-10	XX	XX	XX	XX	XX	XX
CVC-63-D1-S2-10	XX	XX	XX	XX	XX	XX
CVC-63-N-S2-10	XX	XX	XX	XX	XX	XX
CVC-63-PC-S2-10	XX	XX	XX	XX	XX	XX
CVC-63-U-S2-10	XX	XX	XX	XX	XX	XX
CVC-63-U1-S2-10	XX	XX	XX	XX	XX	XX
CVC-63-W-S2-10	XX	XX	XX	XX	XX	XX
CVC-63-W1-S2-10	XX	XX	XX	XX	XX	XX
CVC-63-W21-S2-10	XX	XX	XX	XX	XX	XX
CVC-63-W31-S2-10	1.4	XX	PLUG	XX	XX	XX
CVC-63-AD1-S2-W-10-NO	"A"	"AP"	"B"	"X"	"Z1"	"Z2"
CVC-63-AD1-S2-W-10-NO	PLUG	XX	1.4	XX	XX	XX
CVC-63-A-S2-W-10	XX	XX	XX	XX	XX	XX
CVC-63-C-S2-10	XX	XX	XX	XX	XX	XX
CVC-63-C1-S2-10	XX	XX	XX	XX	XX	XX
CVC-63-D1-S2-10	XX	XX	XX	XX	XX	XX
CVC-63-N-S2-10	XX	XX	XX	XX	XX	XX
CVC-63-PC-S2-10	XX	XX	XX	XX	XX	XX
CVC-63-U-S2-10	XX	XX	XX	XX	XX	XX
CVC-63-U1-S2-10	XX	XX	XX	XX	XX	XX
CVC-63-W-S2-10	XX	XX	XX	XX	XX	XX
CVC-63-W1-S2-10	XX	XX	XX	XX	XX	XX
CVC-63-W21-S2-10	XX	XX	XX	XX	XX	XX
CVC-63-W31-S2-10	1.4	XX	PLUG	XX	XX	XX
CVC-63-AD1-S2-W-10-NO	"A"	"AP"	"B"	"X"	"Z1"	"Z2"
CVC-63-AD1-S2-W-10-NO	PLUG	XX	1.4	XX	XX	XX
CVC-63-A-S2-W-10	XX	XX	XX	XX	XX	XX
CVC-63-C-S2-10	XX	XX	XX	XX	XX	XX
CVC-63-C1-S2-10	XX	XX	XX	XX	XX	XX
CVC-63-D1-S2-10	XX	XX	XX	XX	XX	XX
CVC-63-N-S2-10	XX	XX	XX	XX	XX	XX
CVC-63-PC-S2-10	XX	XX	XX	XX	XX	XX
CVC-63-U-S2-10	XX	XX	XX	XX	XX	XX
CVC-63-U1-S2-10	XX	XX	XX	XX	XX	XX
CVC-63-W-S2-10	XX	XX	XX	XX	XX	XX
CVC-63-W1-S2-10	XX	XX	XX	XX	XX	XX
CVC-63-W21-S2-10	XX	XX	XX	XX	XX	XX
CVC-63-W31-S2-10	1.4	XX	PLUG	XX	XX	XX
CVC-63-AD1-S2-W-10-NO	"A"	"AP"	"B"	"X"	"Z1"	"Z2"
CVC-63-AD1-S2-W-10-NO	PLUG	XX	1.4	XX	XX	XX
CVC-63-A-S2-W-10	XX	XX	XX	XX	XX	XX
CVC-63-C-S2-10	XX	XX	XX	XX	XX	XX
CVC-63-C1-S2-10	XX	XX	XX	XX	XX	XX
CVC-63-D1-S2-10	XX	XX	XX	XX	XX	XX
CVC-63-N-S2-10	XX	XX	XX	XX	XX	XX
CVC-63-PC-S2-10	XX	XX	XX	XX	XX	XX
CVC-63-U-S2-10	XX	XX	XX	XX	XX	XX
CVC-63-U1-S2-10	XX	XX	XX	XX	XX	XX
CVC-63-W-S2-10	XX	XX	XX	XX	XX	XX
CVC-63-W1-S2-10	XX	XX	XX	XX	XX	XX
CVC-63-W21-S2-10	XX	XX	XX	XX	XX	XX
CVC-63-W31-S2-10	1.4	XX	PLUG	XX	XX	XX
CVC-63-AD1-S2-W-10-NO	"A"	"AP"	"B"	"X"	"Z1"	"Z2"
CVC-63-AD1-S2-W-10-NO	PLUG	XX	1.4	XX	XX	XX
CVC-63-A-S2-W-10	XX	XX	XX	XX	XX	XX
CVC-63-C-S2-10	XX	XX	XX	XX	XX	XX
CVC-63-C1-S2-10	XX	XX	XX	XX	XX	XX
CVC-63-D1-S2-10	XX	XX	XX	XX	XX	XX
CVC-63-N-S2-10	XX	XX	XX	XX	XX	XX
CVC-63-PC-S2-10	XX	XX	XX	XX	XX	XX
CVC-63-U-S2-10	XX	XX	XX	XX	XX	XX
CVC-63-U1-S2-10	XX	XX	XX	XX	XX	XX
CVC-63-W-S2-10	XX	XX	XX	XX	XX	XX
CVC-63-W1-S2-10	XX	XX	XX	XX	XX	XX
CVC-63-W21-S2-10	XX	XX	XX	XX	XX	XX
CVC-63-W31-S2-10	1.4	XX	PLUG	XX	XX	XX
CVC-63-AD1-S2-W-10-NO	"A"	"AP"	"B"	"X"	"Z1"	"Z2"
CVC-63-AD1-S2-W-10-NO	PLUG	XX	1.4	XX	XX	XX
CVC-63-A-S2-W-10	XX	XX	XX	XX	XX	XX
CVC-63-C-S2-10	XX	XX	XX	XX	XX	XX
CVC-63-C1-S2-10	XX	XX	XX	XX	XX	XX
CVC-63-D1-S2-10	XX	XX	XX	XX	XX	XX
CVC-63-N-S2-10	XX	XX	XX	XX	XX	XX
CVC-63-PC-S2-10	XX	XX	XX	XX	XX	XX
CVC-63-U-S2-10	XX	XX	XX	XX	XX	XX
CVC-63-U1-S2-10	XX	XX	XX	XX	XX	XX
CVC-63-W-S2-10	XX	XX	XX	XX	XX	XX
CVC-63-W1-S2-10	XX	XX	XX	XX	XX	XX
CVC-63-W21-S2-10	XX	XX	XX	XX	XX	XX
CVC-63-W31-S2-10	1.4	XX	PLUG	XX	XX	XX
CVC-63-AD1-S2-W-10-NO	"A"	"AP"	"B"	"X"	"Z1"	"Z2"
CVC-63-AD1-S2-W-10-NO	PLUG	XX	1.4	XX	XX	XX
CVC-63-A-S2-W-10	XX	XX	XX	XX	XX	XX
CVC-63-C-S2-10	XX	XX	XX	XX	XX	XX
CVC-63-C1-S2-10	XX	XX	XX	XX	XX	XX
CVC-63-D1-S2-10	XX	XX	XX	XX	XX	XX
CVC-63-N-S2-10	XX	XX	XX	XX	XX	XX
CVC-63-PC-S2-10	XX	XX	XX	XX	XX	XX
CVC-63-U-S2-10	XX	XX	XX	XX	XX	XX
CVC-63-U1-S2-10	XX	XX	XX	XX	XX	XX
CVC-63-W-S2-10	XX	XX	XX	XX	XX	XX
CVC-63-W1-S2-10	XX	XX	XX	XX	XX	XX
CVC-63-W21-S2-10	XX	XX	XX	XX	XX	XX
CVC-63-W31-S2-10	1.4	XX	PLUG	XX	XX	XX
CVC-63-AD1-S2-W-10-NO	"A"	"AP"	"B"	"X"	"Z1"	"Z2"
CVC-63-AD1-S2-W-10-NO	PLUG	XX	1.4	XX	XX	XX
CVC-63-A-S2-W-10	XX	XX	XX	XX	XX	XX
CVC-63-C-S2-10	XX	XX	XX	XX	XX	XX
CVC-63-C1-S2-10	XX	XX	XX	XX	XX	XX
CVC-63-D1-S2-10	XX	XX	XX	XX	XX	XX
CVC-63-N-S2-10	XX	XX	XX	XX	XX	XX
CVC-63-PC-S2-10	XX	XX	XX	XX	XX	XX
CVC-63-U-S2-10	XX	XX	XX	XX	XX	XX
CVC-63-U1-S2-10	XX	XX	XX	XX	XX	XX
CVC-63-W-S2-10	XX	XX	XX	XX	XX	XX
CVC-63-W1-S2-10	XX	XX	XX	XX	XX	XX
CVC-63-W21-S2-10	XX	XX	XX	XX	XX	XX
CVC-63-W31-S2-10	1.4	XX	PLUG	XX	XX	XX
CVC-63-AD1-S2-W-10-NO	"A"	"AP"	"B"	"X"	"Z1"	"Z2"
CVC-63-AD1-S2-W-10-NO						



VICKERS®

A TRIMONA COMPANY

CVCS SERIES
CVI SERIES
CARTRIDGE VALVE
COVERS &
INSERTS
CVCS - Directional Valves
CVCS - Pressure Relief Valves
CVCS - Pressure Reducing Valves



Vickers, Incorporated

P.O. Box 302

Troy, Michigan 48007-0302

Released 1-1-89

1-3611-S

TABLE OF CONTENTS

SECTION I - GENERAL INFORMATION & UNIT DESCRIPTION

1	A. Purpose of Manual
1	B. General Unit Description
1	C. Unit Identification/Model Code
1	D. Model Designation Change

SECTION II - DIRECTIONAL COVERS

5	A. Directional (N Function)
6	B. Directional with Stroke Adjuster (A Function)
6	C. Directional with NFPA-D03/D05 Pilot Interface (D1 & D2 Function)
7	D. Directional Cover with NFPA-D03 Pilot Interface and Stroke Adjuster(AD1 Function)
8	E. Shuttle (W Function)
8	F. Shuttle / NFPA-D03 Pilot Interface (W11 & W31 Function)
8	G. Pilot Operated Check (PC Function)

SECTION III - PRESSURE RELIEF COVERS

11	A. Pressure Relief (C Function)
11	B. Pressure Relief Cover with NFPA-D03 Pilot Interface (C1 Function)
11	C. Unloading (U Function)
13	D. Unloading with NFPA-D03 Pilot Interface (U1 Function)

SECTION IV - PRESSURE REDUCING COVERS

14	A. Pressure Reducing (X Function)
14	B. Pressure Reducing with NFPA-D03 Pilot Interface (X1 Function)

SECTION V - CARTRIDGE VALVE INSERTS

16	A. Flow Ratings
17	B. Insert Kit Description
17	C. Insert Kit Identification

Section VI - SYSTEM INSPECTION & MAINTENANCE

20	A. Installation Drawings
20	B. Mounting
20	C. Piping and Tubing
20	D. Hydraulic Fluid Recommendations
20	E. Adding Fluid to the System
20	F. System Cleanliness
20	G. Sound Level
20	H. Adjustments
21	I. Product Life
21	J. Replacement Parts

SECTION VII - OVERHAUL & PARTS INFORMATION

22	A. Service Tools
22	B. Cartridge Cover Disassembly & Assembly
22	C. Exploded view cover drawings Figures 18 thru 28
25-38	C. Cartridge Insert Disassembly & Assembly

APPENDIX

Cartridge Valve Block Diagram - Directional Covers
 Cartridge Valve Block Diagram - Pressure Relief Covers
 Cartridge Valve Block Diagram - Pressure Reducing Covers
 Manifold Block Recess Dimensions
 Standard Orifice Plug Locations

SECTION I - GENERAL INFORMATION & UNIT DESCRIPTION

A. Purpose of Manual

This manual describes basic operating characteristics and service and overhaul information for slip-in cartridge type valves. Section I provides unit description and unit identification information. Sections II, III and IV provide information on the directional, pressure relief and pressure reducing cover assembly. Section V provides information on cartridge valve inserts. Section VI provides installation and system inspection information and Section VII provides overhaul and parts information. The Appendix provides additional information on cartridge valve arrangements, bolt kits, standard orifice plug locations and manifold block dimensions.

B. General Unit Description

The cartridge valve consists of two sections - the valve cover assembly and the valve insert kit. The cover controls a particular function while the insert serves as the working section. Cartridge valve covers are mounted to a manifold block with four cap screws. The cover retains the valve insert within the manifold block cavity. Cartridge valves are available in 16, 25, 32, 40, 50 and 63 millimeter sizes. The cartridge valve size represents the nominal manifold block port size. Figure 1 illustrates a typical cartridge valve arrangement.

C. Unit Identification/Model Code

Figure 2 shows a cartridge valve nameplate that is located at the valve cover. The model code identifies the type of cartridge valve cover (CVCS) assembly. In the past, these slip-in type cartridge valves were identified with the model code CVC.

D. Model Designation Change

To conform to the Draft International Standard (DIS #7368), these valves are now offered under the model code CVCS. The interfacing of these valves remains the same as before under CVC. The internal porting in the cover has changed for the "D1", "PC", "W", and "W11" in all sizes. All other versions remain the same (i.e., "N", "D2",

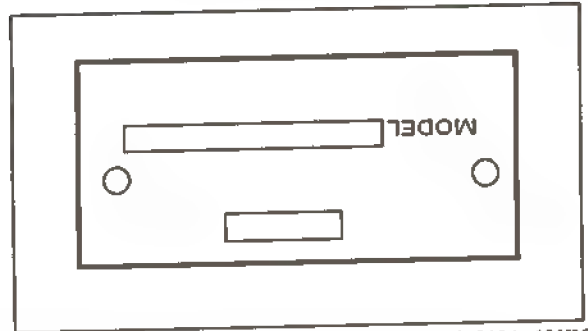


Figure 2. Nameplate

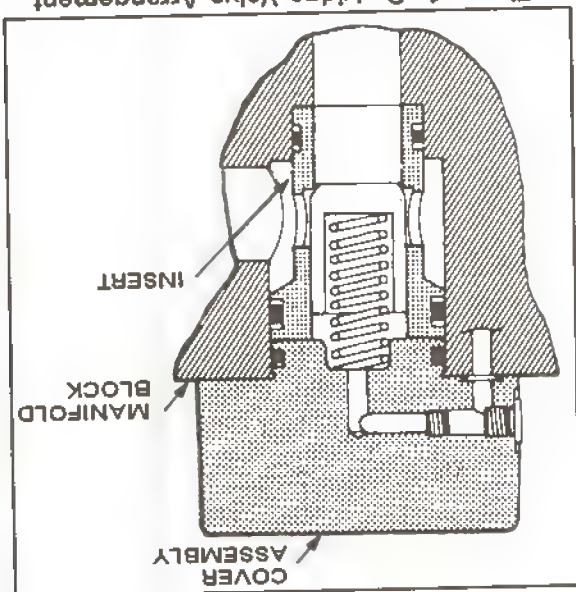


Figure 1. Cartridge Valve Arrangement

"W31", "A", "AD1", "C", "C1", "U", "X" and "X1".

NOTE

When replacing a CVC with a CVCS using the "D1" and "W11" functions, the pilot valve must be reoriented as detailed below.

The second part of this change involves pilot valve orientation. For example, on current CVC versions of the "D1" cover, the "b" solenoid of the pilot valve lined up over the "Z1" interface port of the cover. Under the CVCS, it will line up over the "y" port. The only covers that change the pilot valve axis orientation are the "D1" and "W11." Refer to the model code (Table I) to identify the characteristics of the cover assembly. Note that the cover assembly has SAE threads (includes plugs and orifices).

The cartridge valve insert (CVI) kit has been identified by a model number mounted on the manifold. See Figure 2a. The code identifies the insert valve size, function and the design. Refer to the model code (Table Ia) to identify the characteristics of the cartridge valve insert kit. Note that the

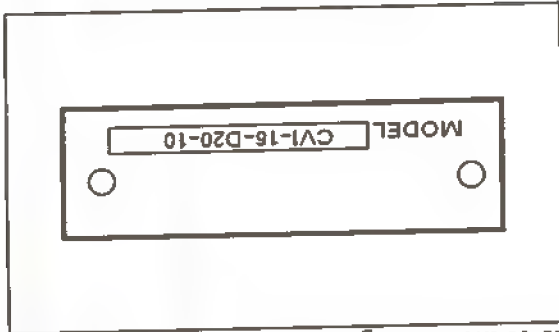


Figure 2a. Insert Identification

insert valve size and the cover size are the same. If the code is not stamped on the insert sleeve, refer to Section V-C to identify the type of insert kit. If 'Made in England' is stamped on the nameplate, the cover assembly is part of a cartridge valve unit

(CVU). The CVU consists of a cartridge valve cover (CVCS) assembly and a cartridge valve insert (CVI) kit. If this is the case, refer to Table 2 and select the appropriate installation and parts drawings. Note that the cover assembly has metric threads (includes plugs and orifices).

Cartridge Valve Type	Installation Drawing	Parts Drawing
Directional	GB-V-1501	S-F-40556
Pilot Operated Check	GB-V-1501	S-F-40557
Shuttle	GB-V-1501	S-F-40557
Pressure Relief	GB-V-1502	S-F-40558
Pressure Reducing	GB-V-1503	S-F-40559

Table 2. European Service Drawings for CVU Cartridge Valves

NOTE
Refer to Table 8 for
CVCS Installation
Drawings

Table 1. Model Code for Cartridge Valve Cover (CVCS)

MODEL CODE BREAKDOWN
 (F3) - CVCS - ** - ** - ** - ** - ** - ** - 10 - (*) - (N*) - (****)

1
Special Seals

Seals for mineral oil & fire resistant fluids.

2
Cartridge Valve Cover

Conforms to ISO DIS #7368

3
Cartridge Valve Size(mm)

16, 25, 32, 40, 50, 63

4
Function

Directional Valve
N,D1,D2,PC,W,
W11,W31,A,AD1
Pressure Relief
C,C1,U,U1
Pressure Reducing
X,X1

5
Plugs, Seals, Bolts

Plugs B - BSP Thd. (Europe)
 S - SAE Thd. (USA)
Seals 1 - DIN 3770 (Europe)
 2 - ISO 3601 (Europe)
 & USA)
Bolts 9 - Metric (Europe)
 Blank - Without bolts
 (USA)

6
Adjuster Mechanism

(A,AD1,C,C1,U,U1,X,X1 Only)
M - Micrometer Knob
K - Micrometer Knob
W - Rod with lock nut
with key lock

7
Adjuster Pressure Range

(C,C1,U,U1,X,X1 Only)
125 3 - 125 bar (44-1800 psi)
245 5 - 245 bar (72-3550 psi)
350 8 - 350 bar (116-5000 psi)

8
Design

9
Model Suffix

For special features

10
-AD1 Function

(Omit for other cover types)
NC - Normally Closed
NO - Normally Open

11
Office Location/Size*

(Omit if not required)
X08 - 0.8mm orifice @ 'X' port
Z112 - 1.2mm orifice @ 'Z1' port
AP99 - No orifice in 'AP' port
Z200 - Solid plug @ 'Z2' port

* Orifices may be removed or added to the cartridge valve cover to fine tune the system. If the model code on the cover nameplate has a letter/number code after the design, orifices are installed into specific port locations, different from the standard assembly. Example: -10-X08 indicates an 0.8mm orifice is installed into the 'X' port, within the cover. Orifices may be installed in the 'X', 'Z1', 'Z2', 'P', 'A', 'B' and 'AP' port, depending on cover type and application. Refer to the Appendix for standard orifice locations and sizes for each cartridge valve cover.

▲ These cartridge covers are in accordance with ISO draft international standard #7368. This cover internal porting changes to the D1, PC, W and W1 covers from prior published information.

MODEL CODE BREAKDOWN

(F3) - CVI - ** - *** - 2 - * - ** - (*) - (**) - (**)

1 2 3 4 5 6 7 8 9

6 Spring Cracking Pressure bar (psi)

Type	L	M	H
D10	Blank	Blank	2.0(30)
D11	0.3(4)	1.4(20)	2.7(39)
D20	0.5(7)	2.5(36)	5.0(72)
F	0.5(7)	2.5(36)	5.0(72)
R	0.5(7)	2.5(36)	5.0(72)

Blank - No letter code used.

Valve Size (mm)		Function			
16	25	32	40	50	63
-11	-30	-11	-30	-10	-10
-10	-10	-10	-10	-10	-10
-10	-10	-10	-10	-10	-10
D11/D20/F/R		X1			

8 Model Suffix
For special features

9 Office 'AX'

(D11 with orifice only)
16 - 1.6mm
18 - 1.8mm
20 - 2.0mm
08 - 0.8mm
10 - 1.0mm
12 - 1.2mm
14 - 1.4mm

1 Special Seals

Seals for mineral
oil & fire resistant
fluids.

2 Cartridge Valve Insert

3 Cartridge Valve Size (mm)

4 * Function

D10 (1:1)
C,C1

D11 (1:1.1)
N

D11 with orifice
U,U1

D20 (1:2)
D1,D2,N,PC,W,
W11, W31

F (1:2)
A,AD1

R (1:2)
N,D1,D2

X1
X,X1

5 Seals

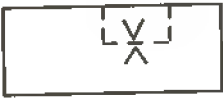
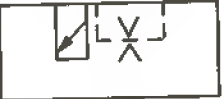
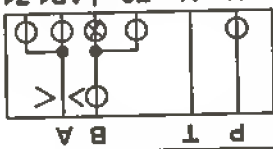
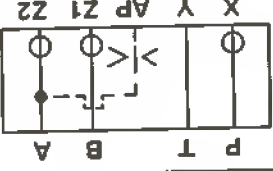
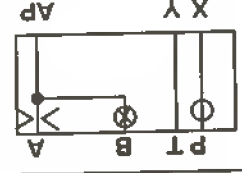
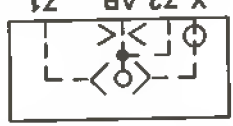
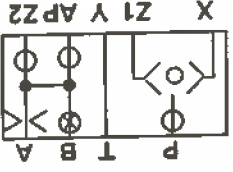
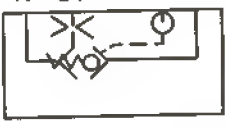
1 - DIN 3770 (Europe)
2 - ISO 3601 (Europe
& USA)

* - Most common insert/cover combinations

Table 1a. Model Code for Cartridge Valve Insert (CVI)

SECTION II - DIRECTIONAL COVERS

The function of the directional cover assembly is to direct flow from one port to another. Eight types of directional covers are available. The type of directional cover used depends upon application requirements. The eight types of directional covers are listed below. Under the CVCS model change the internal porting in the "W11" cover, T goes to Y instead of Z1 and in the "PC" option, Z1 is now the control port instead of the X port.

Cover Type	Functional Symbol	Size (mm)
N		16, 25, 32, 40, 50, 63
A		16, 25, 32, 40, 50, 63
D1		16, 25, 32, 40
D2		50, 63
AD1		25, 40
W		16, 25, 32, 40
W11		16, 25, 32, 40
PC		16, 25, 32, 40

A. Directional (N Function)

This directional cover assembly is available in 16, 25, 32, 40, 50 and 63mm size. The directional cover assembly (shown in Figure 3) contains a pilot pressure passage with an orifice to control the opening and closing rate of the poppet that is located within the cartridge insert. The poppet is controlled by an externally operated pressure source. With sufficient pressure at pilot port 'X', the poppet is closed and flow between 'A' and 'B' port is blocked. The poppet moves upward and flow is from port 'A' to port 'B' when the 'X' port is drained to tank. The amount of pressure required to move the poppet depends upon the insert area ratio and the spring force. Flow is created from 'B' port to 'A' port when the 'X' port is connected to tank and pressure at 'B' port exceeds the pressure at 'A' port plus the equivalent pressure of the spring force. The standard directional cover operation is shown in Figure 3a.

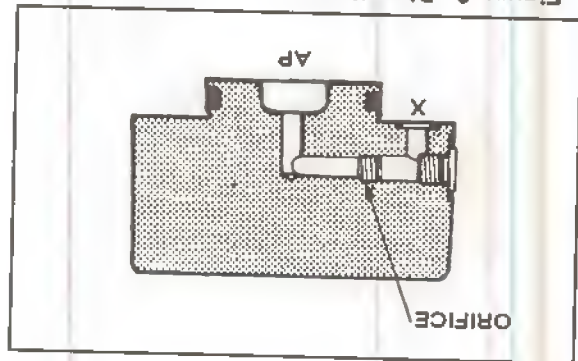


Figure 3. Directional Cover (N Function)

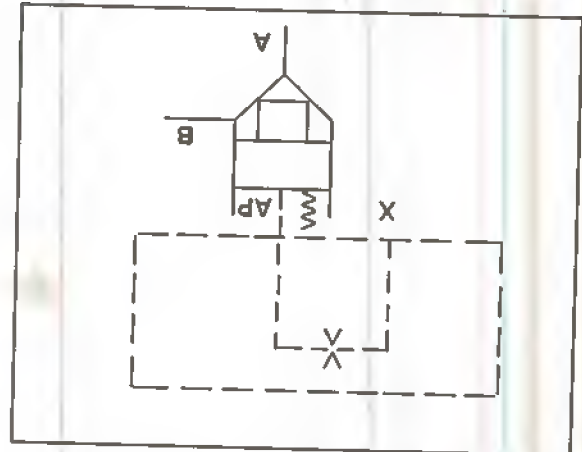


Figure 3a. Directional Cover Operation

B. Directional with Stroke Adjuster (A Function)

This cover assembly is available in 16, 25, 32, 40, 50, and 63mm size. The cover assembly provides directional control and flow regulation in a single unit. Flow regulation is obtained by limiting the travel or stroke of the insert poppet. The throttle opening is set by the position of a rod which extends into the cartridge insert spring chamber. The rod forms a stop to prevent the poppet from fully opening.

Three types of adjustments are available - locknut (W), the micrometer (M), and micrometer with key lock (K). Refer to Figure 4 for the basic locknut adjustment (W) arrangement (W only on 50 and 63mm sizes). The micrometer adjuster provides precise control with the capability of returning to a previous pressure setting when desired. The three adjuster types are described in more detail in Section VII.

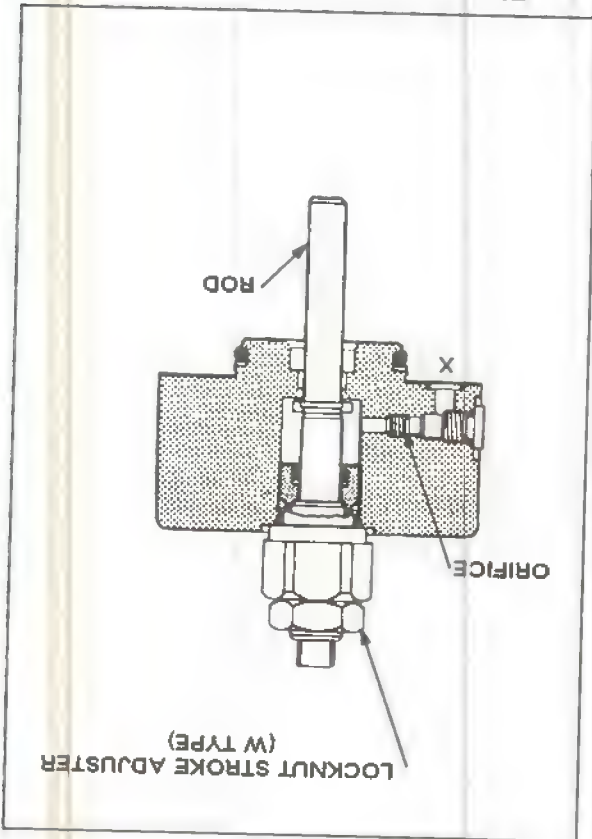


Figure 4. Directional Cover with Stroke Adjuster (A Function)

C. Directional with NFPA-D03/D05 Pilot Interface (D1 & D2 Function)

This type of cover assembly is available in 16, 25, 32, 40, 50 and 63mm size. The 16, 25, 32 and 40mm covers have a NFPA-D03 interface for mounting a DG4V-3 pilot valve. See Figure 5. The

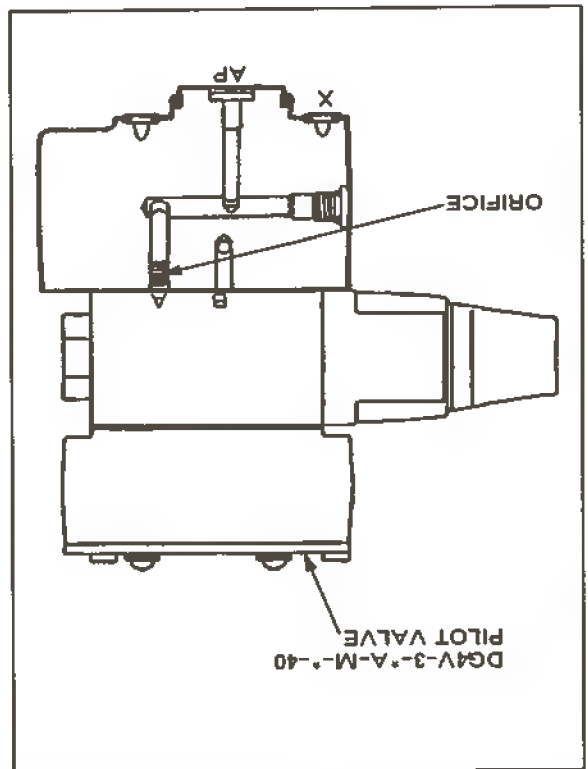


Figure 5. Directional Cover with ISO-4401-03/NFPA-D03 Pilot Interface (Formerly NFPA-D01) 'D1' Function

50mm and 63mm covers have a NFPA-D05 interface for mounting a DG4S4-01 pilot valve. See Figure 5a. Refer to Table 3 for pilot valve information. The difference between the two cover sizes is the interface porting relationship to ports 'Z1' and 'Z2'. The integrally mounted pilot valve provides a compact, convenient package for pressure source switching to control the opening and closing of the insert poppet.

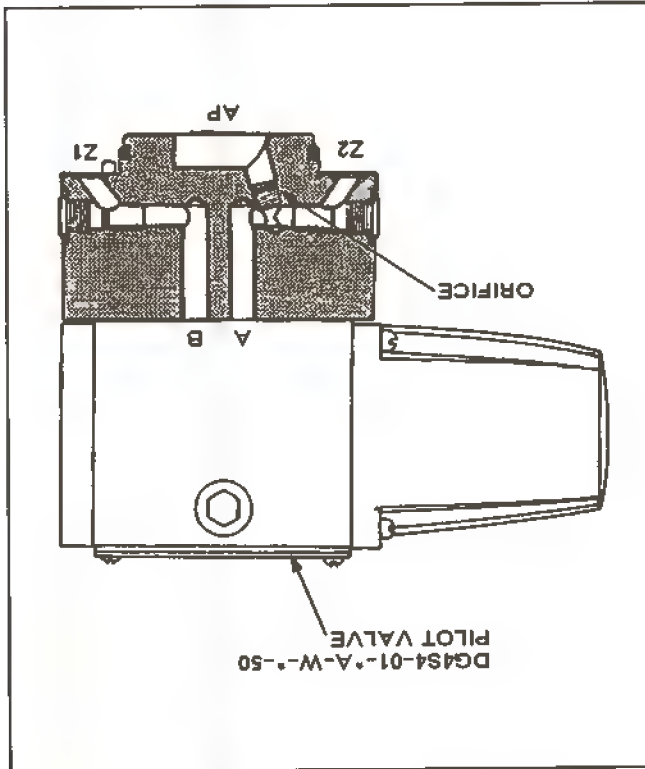


Figure 5a. Directional Cover with ISO-4401-05/NFPA-D05 Pilot Interface (Formerly NFPA-D02) 'D2' Function

Table 3. Pilot Valve Information

NFPA-D03 INTERFACE			NFPA-D05 INTERFACE		
Model	Parts Drawing	Installation Drawing	Model	Parts Drawing	Installation Drawing
DG4V-3-A-40	I-3861-S	517351	DG4S4-01-A-W-50	I-3557-S	517410
DG4V-3-B-40	I-3862-S		DG4S4-01-B/C-W-50	I-3558-S	
DG4V-3-C-40	I-3863-S		DG4S4-01-N-W-50	I-3559-S	
DG4V-3-F-40	I-3864-S		DG4S4-01-A-50	I-3478-S	517401
DG4V-3-N-40	I-3865-S		DG4S4-01-C-50	I-3477-S	
			DG4S4-01-N-51	I-3471-S	

D. Directional Cover with NFPA-D03 Pilot Interface and Stroke Adjuster (AD1 Function)

This type of cover combines the pilot interface and stroke adjuster feature. The pilot valve switches pressure to or from the 'AP' port to open or close the poppet. The flow is then regulated by the stroke adjuster to a desired flow rate. This type of cover combination is only available in the 25 and 40mm valve size. With the pilot valve de-energized, the insert poppet is normally open when a solid plug is installed at the 'A' port and an orifice plug is installed at the 'B' port of the cover (interface location). The insert poppet is normally closed when the solid plug and orifice plug location is reversed (ie. orifice plug installed at 'A' port and a solid plug installed at 'B' port). Figure 6 illustrates the AD1 cover mounted to a DG4V-3 pilot valve. Figure 6a shows the AD1 cover operation.

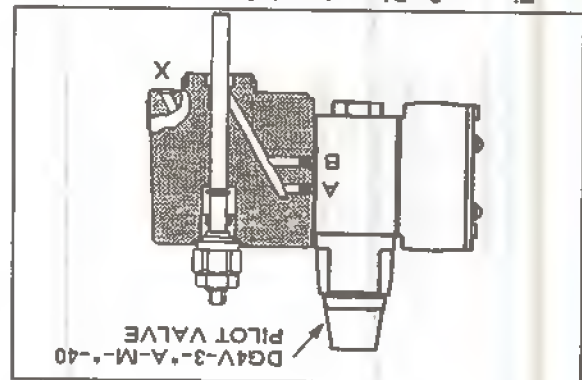


Figure 6. Directional Cover with Pilot Interface & Stroke Adjuster (AD1 Function)

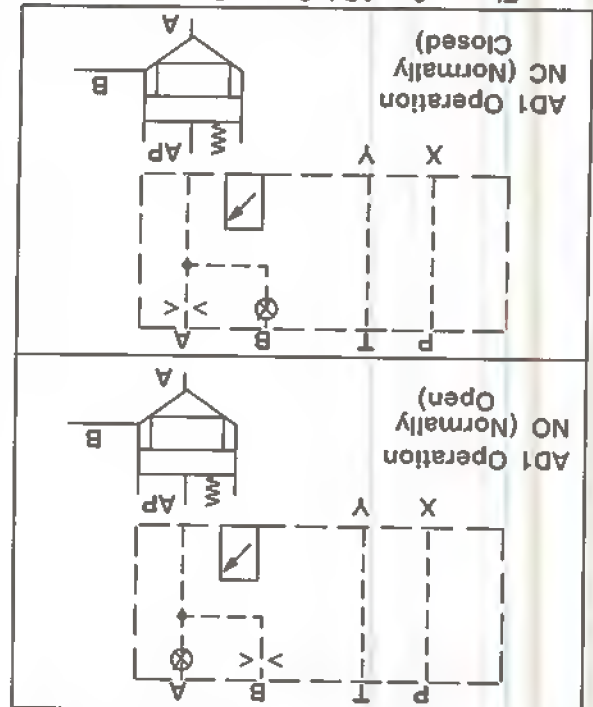


Figure 6a. AD1 Cover Operation

E. Shuttle (W Function)

This shuttle cover assembly is available in the 16, 25, 32 and 40mm size. The shuttle cover will take the higher of two pressures and direct it into the pilot spring area (AP) of the cartridge valve insert. Orifices are available in the cover to control reaction time of the poppet. A seat is pressed into the cover bore and a ball is inserted. The outer plug is then installed into the cover. The outer plug retains the ball and seat between the spring area (AP) and the 'Z1' port. The outer plug also has an O-ring and back-up ring to prevent leakage between the (AP) and 'Z1' port areas. Figure 7 shows the construction of a shuttle cover (W function) assembly. The shuttle valve operation is illustrated in Figure 7a.

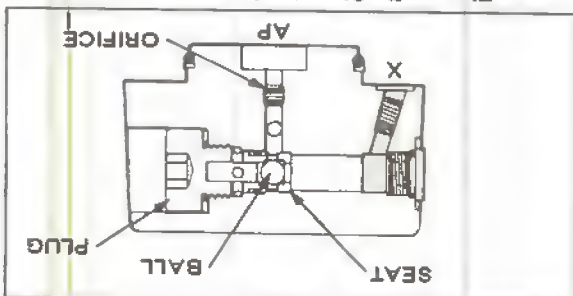


Figure 7. Shuttle Cover Assembly (W Function)

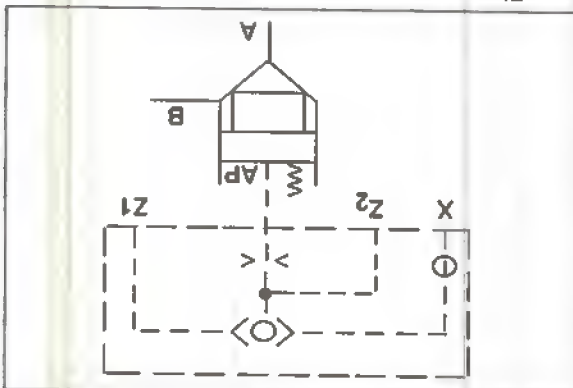


Figure 7a. Shuttle Valve Operation (W Function)

F. Shuttle / NFPA-D03 Pilot Interface (W11, & W31 Function)

Shuttle covers that have the NFPA-D03 pilot interface are available in the 16, 25, 32 and 40mm sizes. Pilot interface covers have two configurations: type W11 and W31. In the W11 cover, when the pilot valve solenoid is de-energized, the cartridge is shut by the higher of the pressures at 'X' or 'Y'. Pilot port 'Z2' can be used to simultaneously pilot a second cartridge.

In the 16mm size (W11 Function), the solid plug is located behind the top SAE plug. In the 25, 32 and 40mm size (W11 Function), the solid plug is located behind the bottom SAE plug.

Type W31 cover is completely different. Its function is to provide a non-reverse flow check, eliminating the need for a separate back flow check. This is achieved by the installation of a solid plug in the 'B' port and an orifice in the 'A' port of the interface.

Figure 8 illustrates the two types of shuttle cover configurations and their respective plug locations. Refer to Figure 23 and 23a for parts breakdown. Refer to Table 3 for pilot valve drawings.

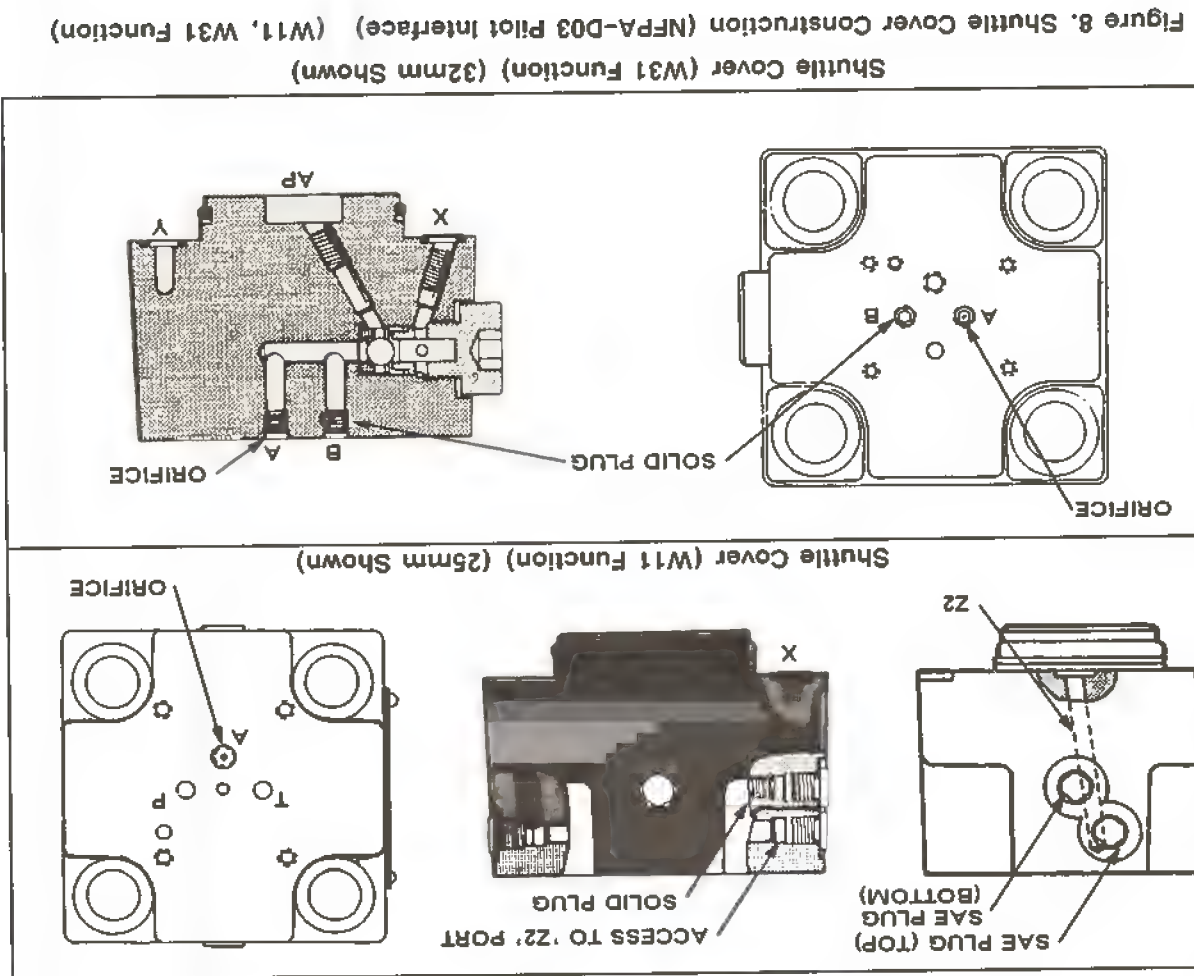
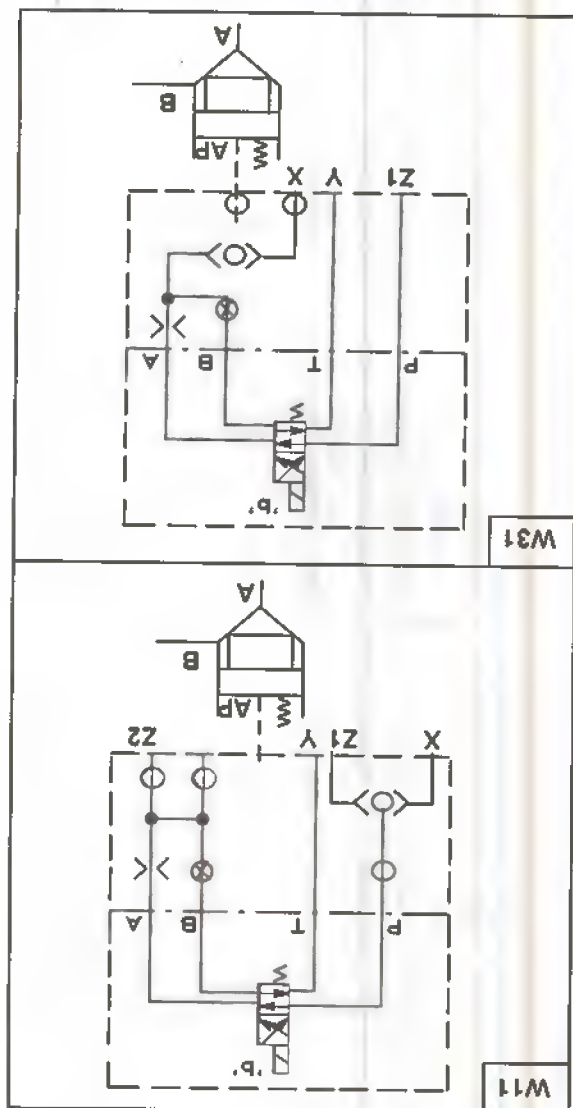


Figure 8. Shuttle Cover Construction (NPPA-D03 Pilot Interface) (W11, W31 Function)

Figure 8a. Shuttle Cover Operation (W11 and W31 Functions)



The pilot operated check cover assembly is available in the 16, 25, 32 and 40mm size. Figure 9 shows the construction of a pilot operated check cover. Three pilot ports are used:

G. Pilot Operated Check (PC Function)

Figure 8a illustrates the operation of the shuttle valve for the W11 and W31 functions.

Figure 9a. Pilot Operated Check Operation

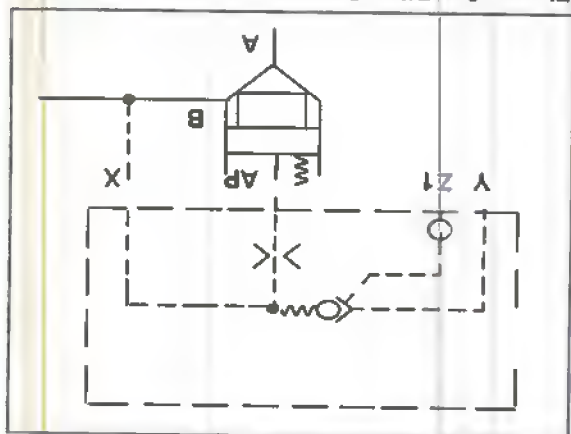
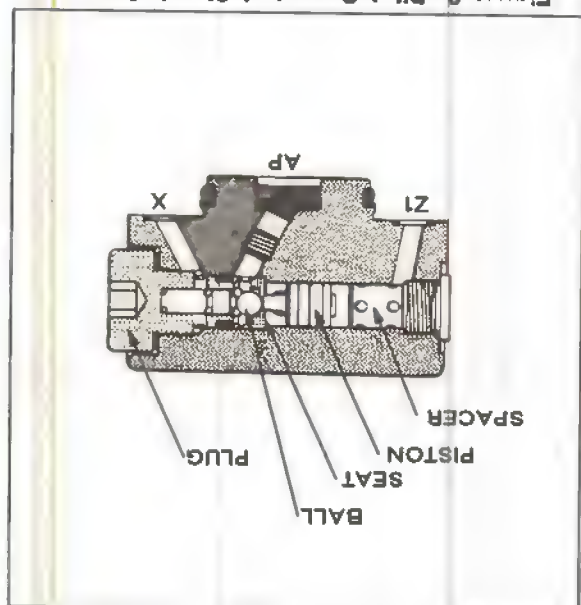


Figure 9. Pilot Operated Check Cover (PC Function)



A simple check valve is created when there is no signal at the 'Z1' port. Flow can pass from 'A' to 'B' if the pressure in the 'A' port is greater than the pressure in the 'B' port plus the spring force. Flow is blocked from 'B' to 'A'. See Figure 9a.

- The 'X' port is drilled in the manifold block to connect with the 'B' port of the insert.
- The 'Y' port is normally connected to a drain line or tank port.

SECTION III - PRESSURE RELIEF COVERS

Model coding is now CVCS but no internal porting has changed.

The pressure relief cover assembly is used to limit system pressure to a desired pressure setting. The pressure setting is determined by the cover spring force and the adjuster mechanism position. Pressure relief covers are available in the 16, 25, 32 and 40mm size. Four types of pressure relief covers are available. The pressure relief covers and their respective functions and sizes are listed below.

Cover Type	Functional Symbol	Size (mm)
C		16, 25, 32, 40
Pressure Relief		16, 25, 32, 40
C1		16, 25, 32, 40
Pressure Relief with NPPA-D03 Pilot Interface		16, 25, 32, 40
U		16, 25, 32, 40
Unloading		16, 25, 32, 40
U1		16, 25, 32, 40
Unloading with NPPA-D03 Pilot Interface		16, 25, 32, 40

A. Pressure Relief (C Function)

This pressure relief cover assembly is available in the 16, 25, 32, and 40mm size. The cover assembly (shown in Figure 10) consists of a seat, piston, spring, orifice plugs, seals, and a pressure adjuster mechanism. The adjuster mechanism may be the basic locknut, the micrometer, or the micrometer with keylock type.

Figure 10a illustrates the operation of the pressure relief valve. The orifice plug at the (AP) area dampens the reaction time of the insert poppet and prevents instability. When system pressure at the (AP) area exceeds the pressure at the (AP) area, the insert poppet lifts off its seat and allows flow from (A) port to (B) port (tank). This relieves system pressure at the (A) port.

Venting the valve by opening (Z1) to tank will permit flow to occur from (A) to (B) at low pressure. Vent pressure will be equivalent to the spring force on the cartridge poppet plus any back pressure present in the vent line. The (AP) area is connected internally within the cover to the (Z1) port.

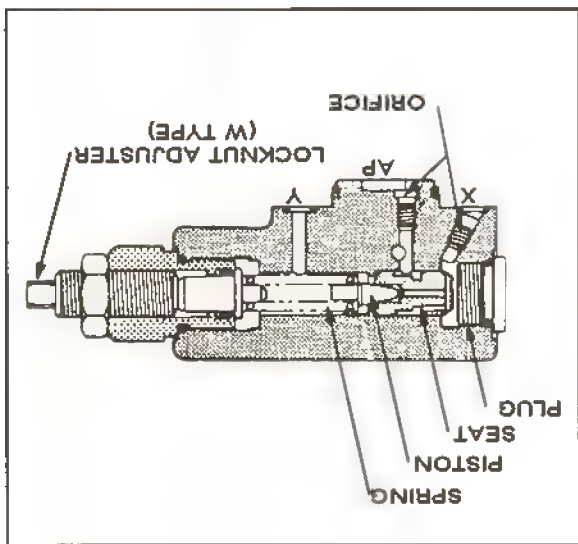


Figure 10. Pressure Relief Cover (C Function)

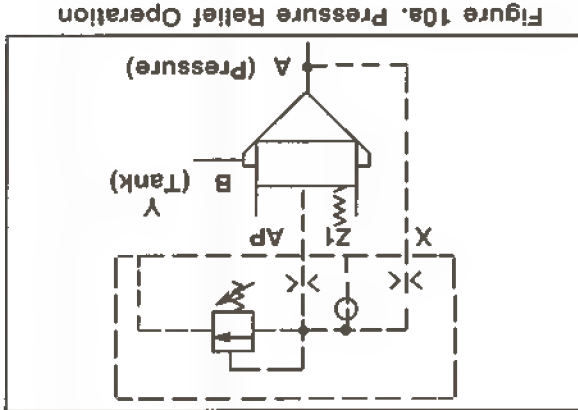


Figure 10a. Pressure Relief Operation

B. Pressure Relief Cover with NPPA-D03 Pilot Interface (C1 Function)

This cover assembly (shown in Figure 11) is available in the 16, 25, 32, and 40mm size and is used for mounting a pilot valve such as a DG4V-3-**-40 or CGE-02-**-22. The cover functions like the standard relief except the pressure from (A) is either blocked or directed to tank by the pilot valve. See Figure 11a. When the pilot valve solenoid is de-energized, the relief valve is vented to tank. The relief valve operates at its relief pressure setting, when the pilot valve solenoid is energized. The (Z1) port is a remote vent connection. Block the (Z1) port if the remote vent feature is not used.

NOTE
If a CGE-02 pilot valve is used, install a solid plug into the top of relief valve cover at the 'B' port location to avoid external leakage. See Table 10 for orifice kits. Refer to parts drawing I-3695-S and installation drawing 519205 for CGE-02 applications.

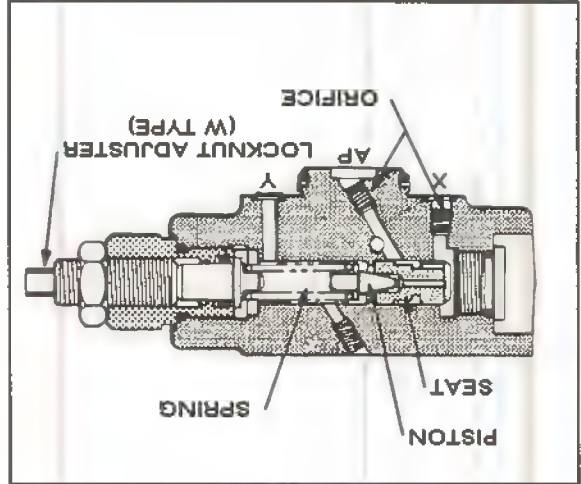


Figure 11. Pressure Relief Cover with Pilot Interface (C1 Function)

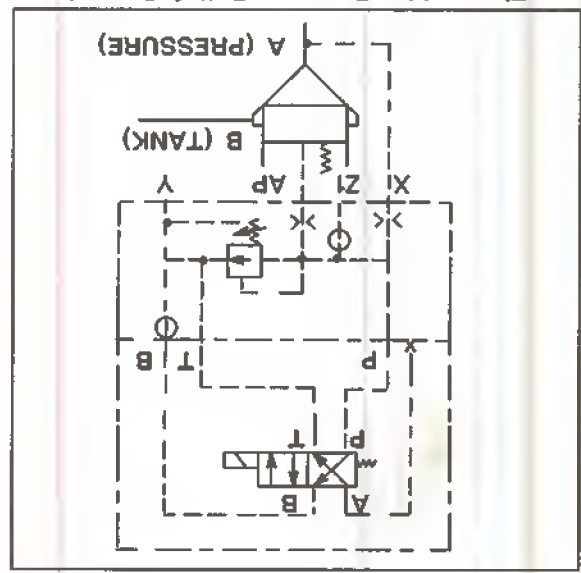


Figure 11a. Pressure Relief Operation with Pilot Interface

A pressure relief module (CVGC-3-*-**--10) may be installed between the pilot valve and the relief valve cover on 16, 25, 32 and 40mm cartridge valves. The CVGC-3 module is used on applications that require both a low and high pressure relief setting. Figure 11b illustrates a cartridge valve arrangement with the pressure relief module. Refer

to Table 4 for the pressure relief module model code breakdown. In all applications, the highest pressure setting is controlled by the cover and the lower pressure setting is controlled by the CVGC-3 module.

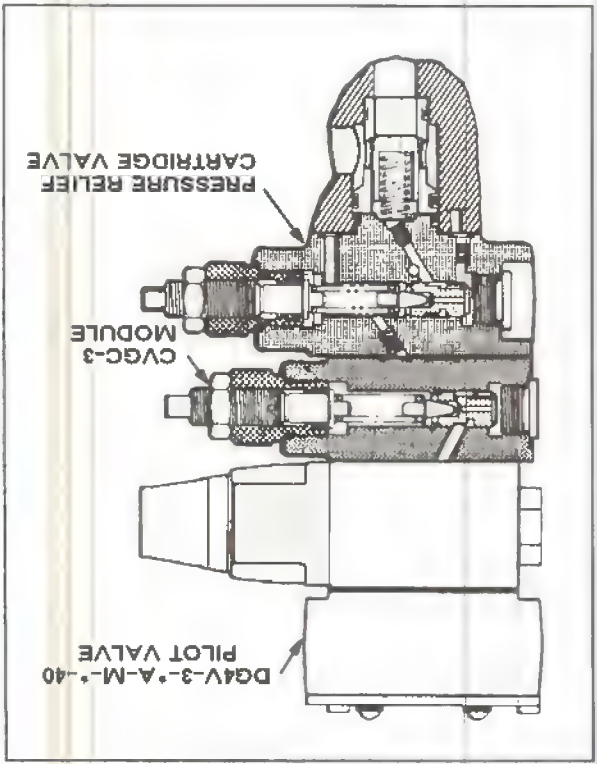


Figure 11b. Pressure Relief Cartridge Valve with Pressure Relief Module for Dual Pressure Control

CVGC-3-*-**--10	Pressure Relief Module
Design	ISO-4401-03 (NFA-D03) Interface
Pressure Range	Adjuster type
125 - 43-1800 psi	W - Locknut
245 - 72-3550 psi	M - Micrometer
350 - 116-5000 psi	K - Micrometer & keylock

Note: 14.5 psi = 1 bar

Table 4. Model Code for Pressure Relief Module

C. Unloading (U Function)

This type of cover assembly is similar to the pressure relief cover. Available sizes are 16, 25, 32 and 40mm. The valve is unloaded when the pressure at the 'X' port reaches 85% of the relief pressure setting. The 'X' port is independent of the other ports. Venting is controlled through the 'Z1' port. System pressure is sensed through the 'AX' orifice in the insert poppet. Figure 12 shows the construction of the unloading cover. Figure 12a illustrates the unloading valve operation.

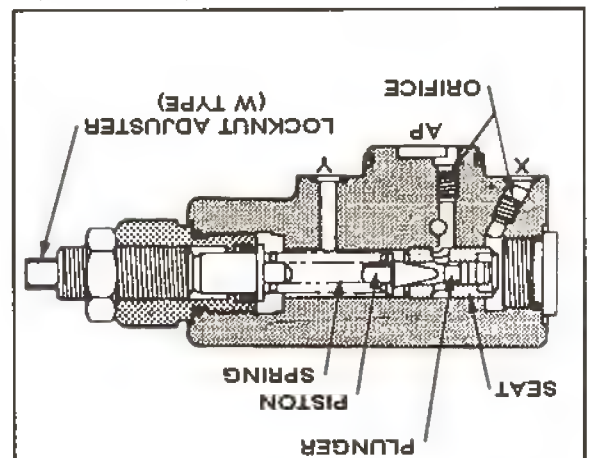


Figure 12. Unloading Cover (U Function)

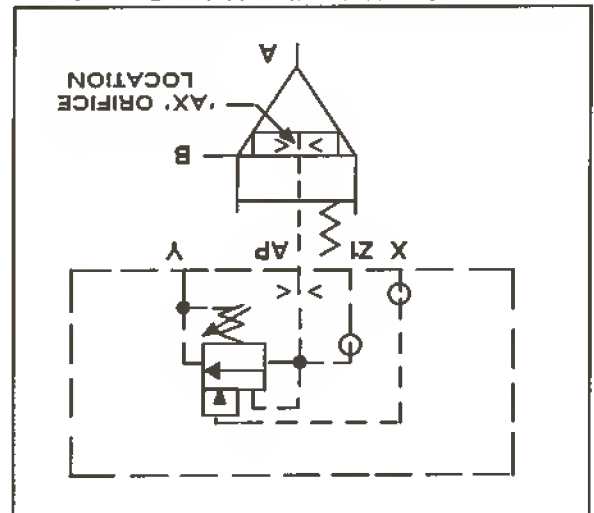


Figure 12a. Unloading Valve Operation

D. Unloading with NFPA-D03 Pilot Interface (U1 Function)

This type of cover assembly is available in the 16, 25, 32 and 40mm size. When the pilot valve sol-

enoid is energized, system pressure is at the maximum level set by the adjuster on the cartridge cover. The unloading function is controlled through the 'X' port. System pressure is vented to tank when the pilot valve solenoid is de-energized. Figure 13 shows the construction of the cover assembly. Figure 13a illustrates the unloading operation with a pilot valve. Note that the insert poppet has an 'AX' orifice.

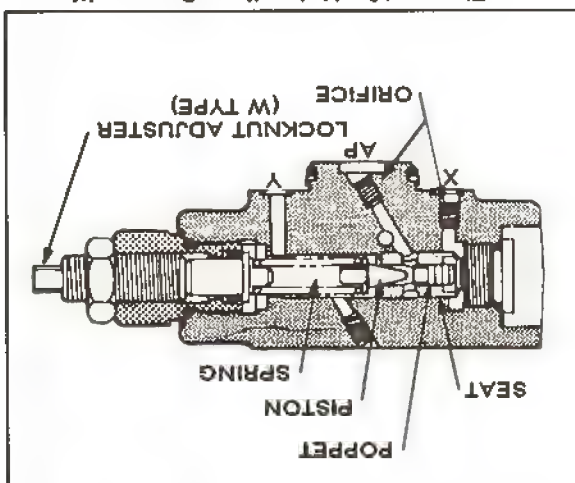


Figure 13. Unloading Cover with NFPA-D03 Interface (U1 Function)

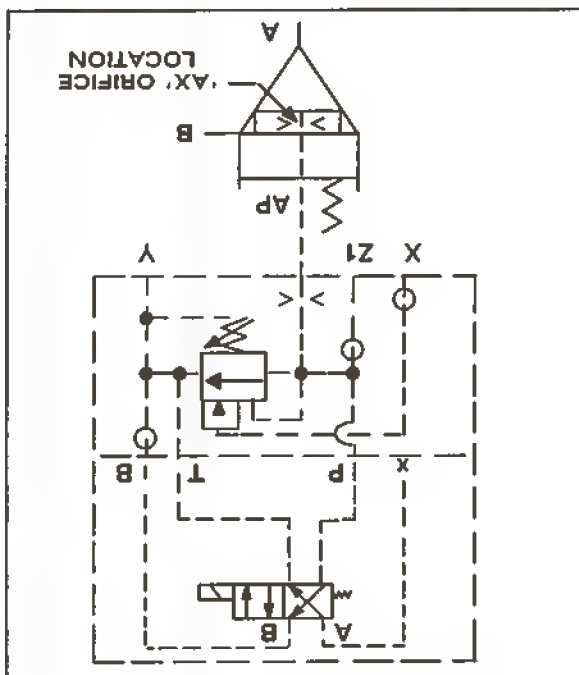


Figure 13a. Unloading Operation with Pilot Valve

SECTION IV - PRESSURE REDUCING COVERS

Model coding is now CVCS but no internal porting has changed.

The function of the pressure reducing cover assembly is to provide a constant outlet pressure that is below inlet pressure. Two types of pressure reducing covers are available. The pressure reducing covers and their respective functions and sizes are listed below.

Cover Type	Functional Symbol	Size (mm)
X	Pressure Reducing	16, 25
X1	Pressure Reducing/NPPA-D03 Pilot Interface	16, 25

A. Pressure Reducing (X Function)

Pressure reducing covers are assembled without orifices unless specified by a model code suffix.

Figure 14 shows the construction of a pressure reducing cover assembly. The cover consists of a seat, piston, spring, flow control, seals, and a pressure adjuster mechanism. This cover assembly is available in the 16 and 25mm size.

Figure 14a shows the operation of a pressure reducing valve. The 'B' port is connected to the pressure source. The 'B' port and 'X' port are interconnected within the manifold block. System pressure ('B' port) is fed to the 'X' port to the flow control. The flow control maintains a constant flow across the poppet independent of the flow from 'B' (p1) to 'A' (p2). When load pressure rises at the 'A' port, the insert spool moves to restrict flow to the port, the insert spool moves to restrict flow to the load. If load pressure drops below the cracking pressure within the cover, the insert spring will move the insert poppet to increase flow through the valve to the 'A' port and increases the pressure in the 'A' port to the desired reducing pressure setting.

A check valve is located within the insert poppet to relieve pressure peaks at the load. Outlet pressure will drop to its minimum pressure setting when 'Z1' port is vented.

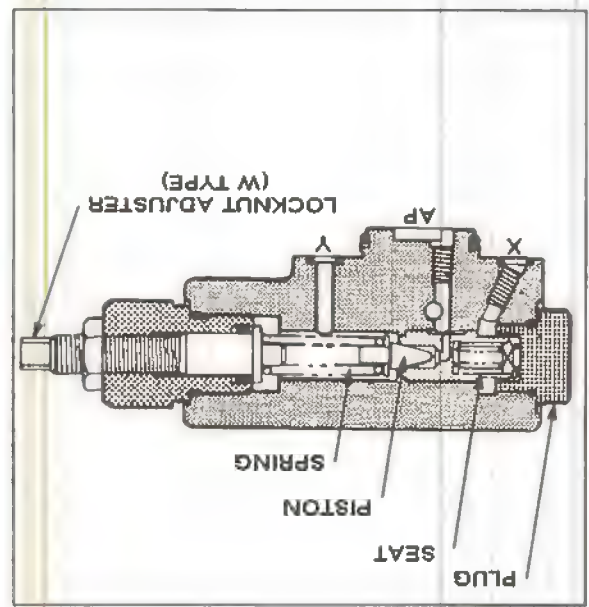


Figure 14. Pressure Reducing Cover (X Function)

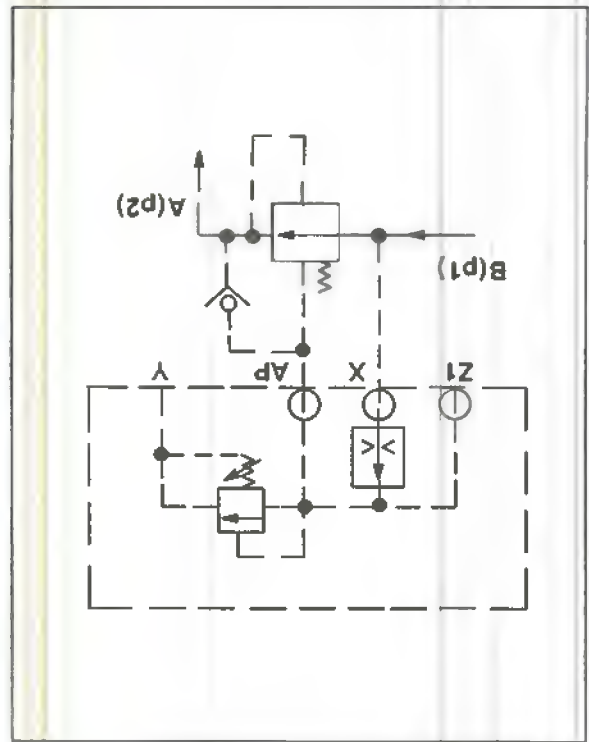


Figure 14a. Pressure Reducing Operation

B. Pressure Reducing with NFPA-D03 Pilot Interface (X1 Function)

This cover assembly (shown in Figure 15) is available in the 16 and 25mm size. This type of cover assembly has an NFPA-D03 interface for mounting a DG4V-3-AL-40 pilot valve, a CGE-02 pilot valve, or a CVGC-3-10 pressure relief module. The pilot valve provides an integral control of the low or high reduced pressure setting. Pressure reducing operation with a pilot valve is shown in Figure 15a.

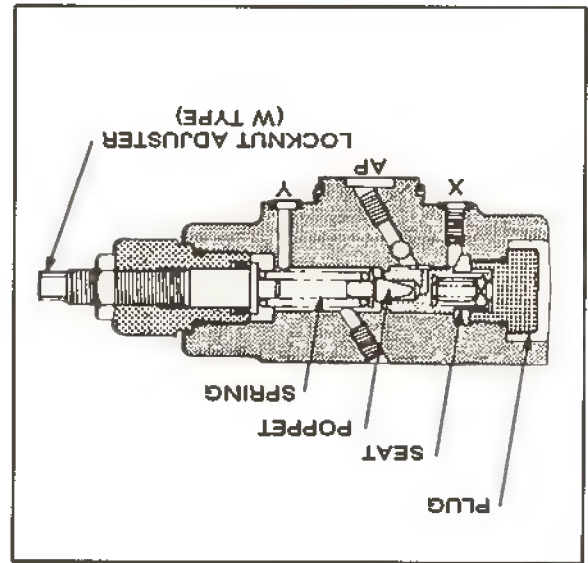


Figure 15. Pressure Reducing Cover with Pilot Interface (X1 Function)

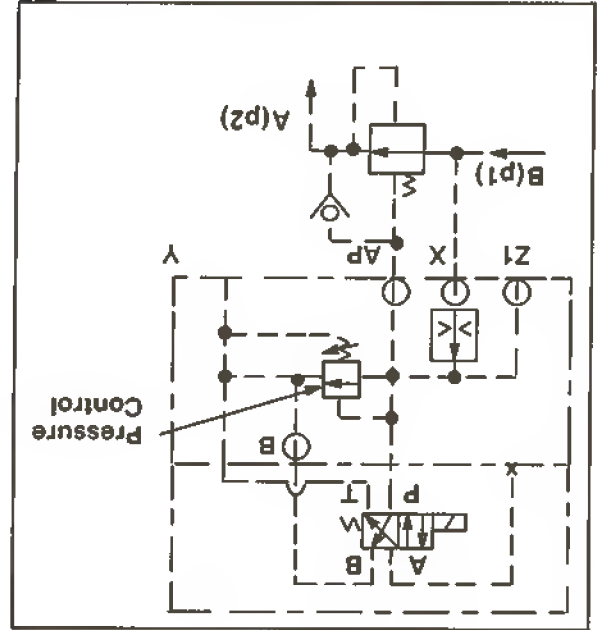


Figure 15a. Pressure Reducing Operation with Pilot Valve

When a CVGC pressure relief module is installed between the reducing cover and the pilot valve, the highest reduced pressure setting is controlled by the pilot valve and the lower reduced pressure setting is controlled by the CVGC module. The high-pressure reduced pressure setting is active when the pilot valve is in the de-energized position. Provide at least 10 bar (150 psi) spread between the high and low pressure settings. Figure 15b shows the operation of a pressure reducing cartridge valve with dual pressure settings.

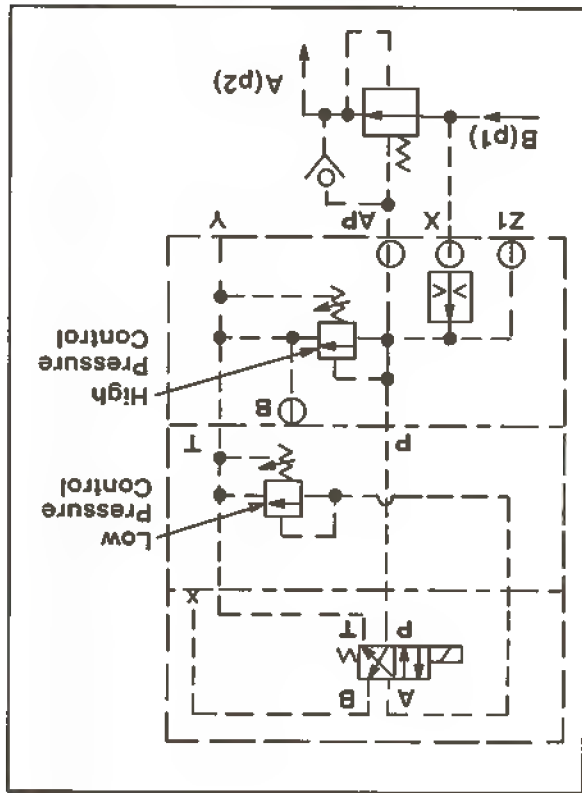


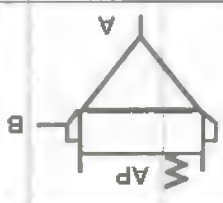
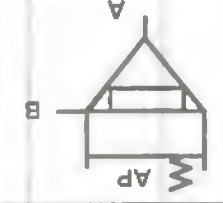
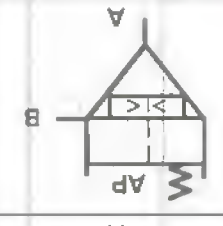
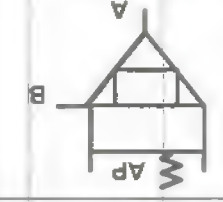
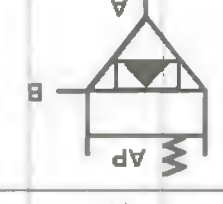
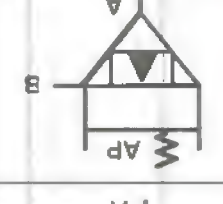
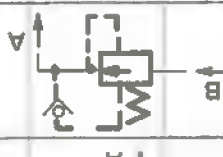
Figure 15b. Pressure Reducing Operation with Dual Pressure Settings

NOTE
If a CGE-02 pilot valve is used, the 'B' port must be plugged at the cover interface.

SECTION V - CARTRIDGE VALVE INSERTS

The cartridge insert functions as the working section of the cartridge valve. Flow passes through the valve when pressure from an external source exceeds the predetermined cracking pressure of the insert. The cracking pressure is determined by the poppet spring force.

The insert provides directional flow for normal applications and controlled flow or restrictive flow for sensitive applications. Seven basic types of inserts are available. The types of inserts and their respective functions and sizes are listed below.

Insert Type	Function	Functional Symbol	Size (mm)
Directional	D10		16, 25, 32, 40
Directional	D11		16, 25, 32, 40, 50, 63
Directional with Orifice	D11		16, 25, 32, 40
Directional	D20		16, 25, 32, 40, 50, 63
Restrictor	R		16, 25, 32, 40, 50, 63
Flow Control	F		16, 25, 32, 40, 50, 63
Reducing	X1		16, 25

A. Flow Ratings

The cartridge insert, unlike a spool type valve, does not have a malfunction flow (with the exception of the X1 pressure reducer insert). The poppet will open or close regardless of flow. As flow increases through the valve, a pressure drop will occur across the valve. Cartridge valves are rated by the amount of flow that passes through the valve with a 14.5 psi (1 bar) or 72.5 psi (5 bar) pressure drop. Table 5 provides flow ratings for 1:1 area ratios. Refer to the installation drawings (Table 8) for flow ratings on other area ratios.

Valve or Port Size (mm)	Port Size (inch)	Flow @ (1 bar)		Flow @ (5 bar)
		Flow @ 14.5 psi (1 bar)	Flow @ 72.5 psi (5 bar)	
16 (mm)	0.63 (inch)	90 (gpm)	200 (gpm)	(53)
25	0.98	210 (55)	450 (119)	(185)
32	1.25	425 (112)	700 (185)	(291)
40	1.57	650 (172)	1100 (291)	(449)
50	1.97	900 (238)	1700 (449)	(740)
63	2.48	1250 (330)	2800 (740)	

Table 5. Cartridge Valve Flow Ratings for 1:1 Area Ratios

B. Insert Kit Description

Figure 16 illustrates the standard cartridge insert kit with a 1:1 area ratio. The insert kit consists of a spring, poppet, sleeve, and associated seals. As illustrated in Figure 16a, the cartridge valve insert has three major areas; the 'A' port, the 'B' port and the 'AP' pilot port. The 'A' port area is circular and is defined by the poppet to sleeve sealing diameter. The 'B' port area is defined as the difference between the 'AP' area and the 'A' area. The 'AP' area is the circular area defined as the diameter at the top portion of the poppet. Pressure at the 'AP' area plus the spring force holds the poppet down. Pressure at the 'A' or 'B' area lifts the poppet off its seat and allows flow through the valve.

NOTE

Unlike all other cartridge inserts, the reducer insert contains a spool rather than a poppet. Therefore, no reference is made to an area ratio. The spool also incorporates an internal check valve which relieves pressure peaks at the load pressure.

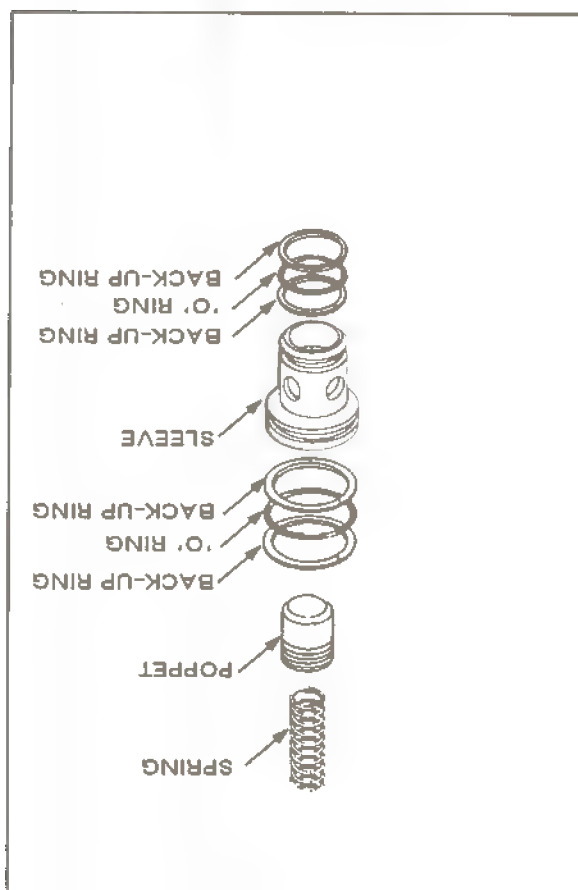


Figure 16. Cartridge Insert Kit

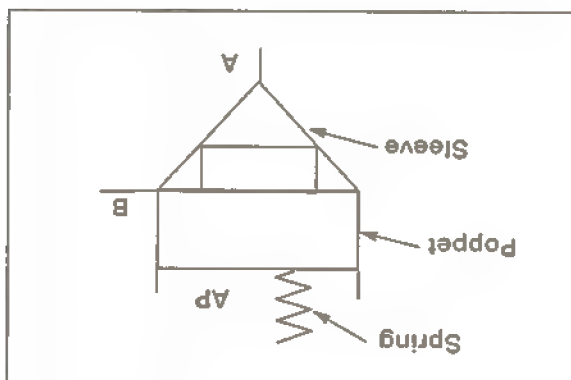


Figure 16a. Cartridge Insert Kit Operation

C. Insert Kit Identification

- Four steps must be taken to determine the type of cartridge insert kit. These steps are:
 - Determine the metric size of the insert kit by measuring across the larger diameter of the sleeve. Refer to Table 6 below to establish the size. Note that the insert kit size is the same as the cover size.

Sleeve Size	mm	Sleeve Size	inch
16	1.260	25	1.771
32	2.362	40	2.952
50	3.543	63	4.724

Table 6. Sleeve Diameter

- Determine the area ratio of the poppet. The poppet area ratio is determined by comparing (AP) area at the top of the poppet with the (A) area at the bottom of the poppet. For example, if the area at the top of the poppet is twice the area of the bottom portion of the poppet, the area ratio is 1:2. Three types of area ratios are available; 1:1, 1:1.1 and 1:2. Poppet area ratios are shown in figure 17.

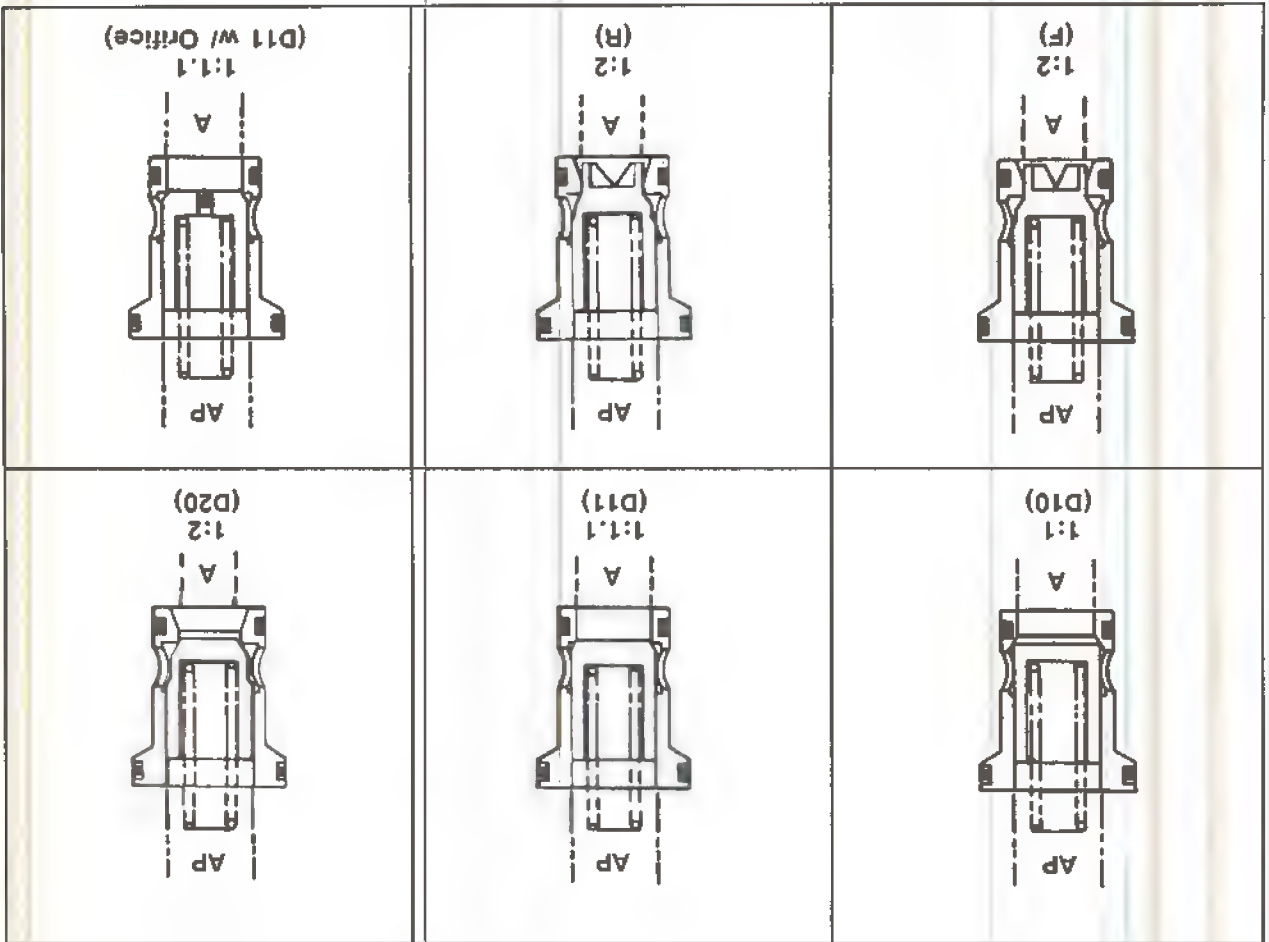


Figure 17. Poppet Area Ratios

3. Measure the insert spring wire diameter with a micrometer. This measurement will determine the cracking pressure of the spring.

4. Determine the type of insert kit and its related function from Table 11. The insert function may be determined by the number/letter code that is stamped on the insert sleeve. See Figure 2a.

NOTE
The spring may be color dyed for easier identification purposes. The spring color is cross referenced to a letter code that identifies spring cracking pressure. If the spring does not have a color, determine the spring cracking pressure by the wire diameter. Refer to Table 7 for the spring wire diameter and color code.

Valve Size	Insert Spring	Wire Diameter	Color Code	Letter Code
16mm	761564	0.039	White	L
	761565	0.055	Blue	M
	761566	0.063	Red	H
25mm	761567	0.059	White	L
	761568	0.079	Blue	M
	761569	0.098	Red	H
32mm	815220	0.079	White	L
	815221	0.104	Blue	M
	815222	0.128	Red	H
40mm	761570	0.098	White	L
	761571	0.118	Blue	M
	761572	0.150	Red	H
50mm	763674	0.138	White	L
	763675	0.181	Blue	M
	763676	0.217	Red	H
63mm	763712	0.171	White	L
	763713	0.232	Blue	M
	763714	0.276	Red	H

Note: L = Low Cracking Pressure
M = Medium Cracking Pressure
H = High Cracking Pressure
(Refer to Table 12 for additional spring information)

Table 7. Insert Spring Dimensions

Section VI - SYSTEM INSPECTION & MAINTENANCE

A. Installation Drawings

The installation drawings listed in Table 8 show installation dimensions and port locations for cartridge valves.

Table 8. Installation Drawings

Cartridge Valve Type	Installation Drawing No.
Directional & Check	519200
Pressure Relief	519210
Pressure Reducing	519205

B. Mounting

In general, cartridge valve mounting is unrestricted. It is recommended that the cartridge valve be mounted on a horizontal axis when a detented pilot valve is attached to the cartridge cover assembly. Cartridge valves are designed to be installed into a manifold block. This minimizes external circuit connections and provides a very compact package. Each cartridge valve installation is unique for a specific application. Many valve functions can be obtained within the manifold block.

C. Piping and Tubing

If a cartridge valve manifold block is actuator mounted, only pressure and tank lines are required. All pipes, tubing, and manifold passages must be thoroughly cleaned. Recommended methods of cleaning are sandblasting, wire brushing, pickling and power flushing.

Maintain only the amount of connections and fittings that are necessary for proper installation. This will minimize flow resistance and the possibility of leakage.

The number of bends in the tubing should be kept to a minimum to prevent excessive turbulence and friction of oil flow. Tubing must not be bent too sharply. The recommended minimum radius for tube bending is three times the inside diameter of the tube.

D. Hydraulic Fluid Recommendations

Hydraulic fluid performs the dual function of lubrication and transmission of power. Hydraulic fluid constitutes a vital factor in a hydraulic system.

term. Careful selection of the fluid should be made with the assistance of a reputable supplier. Proper fluid selection provides satisfactory life and operation of system components. Fluid selected for valves must also be acceptable for the system pumping source and actuator. Refer to data sheet I-286-S for selection of hydraulic fluids.

E. Adding Fluid to the System

When hydraulic fluid is added to replenish the system, it should always be poured through a fine wire screen (200 mesh or finer) or preferably pumped through a 10 micron absolute filter. It is important that the fluid be kept clean and free from any substance that could cause improper operation or wear of the hydraulic unit. Therefore, the use of cloth to strain the fluid should be avoided.

F. System Cleanliness

Thorough precautions should be observed to insure the hydraulic system is clean at all times. Perform the following steps:

1. Clean (flush) any new system to remove paint, metal chips, welding shot, etc.

2. Filter each change of fluid to prevent the introduction of contaminants.

3. Provide continuous fluid filtration to remove sludge, products of wear, and corrosion that has generated during the life of the system. Maintain an ISO cleanliness code of 18/13 or cleaner. System cleanliness may be obtained through the use of OFP, OFR or OFRS series filters.

4. Seal the system to prevent the introduction of airborne contaminants.

G. Sound Level

Noise is only indirectly affected by fluid selection. However, the condition of the fluid is very important for obtaining optimum reductions of system sound levels. Some of the major factors that cause noise in a hydraulic system are:

1. Very high fluid viscosity at start-up temperatures

2. Running the system with moderately high fluid viscosity

3. Improper circuit or reservoir design

H. Adjustments

The only cartridge valves that have an adjustment are the units with the stroke adjustment feature. Stroke adjusters limit the insert poppet travel and act as a flow regulator in the circuit. In general, adjusting the orifice sizes in the valve cover will not be required since the system is tuned during the design phase.

I. Product Life

The service life of this product is dependent upon environment, duty cycle, operating parameters,

Reliable operation throughout the specified operating range is assured only if genuine parts are used. Sophisticated design processes and materials are used in the manufacture of these parts. Substitutions may result in early failure.

J. Replacement Parts

and system cleanliness. Since these parameters vary from application to application, the ultimate user must determine and establish the periodic maintenance requirements to maximize life and detect potential component failure.

SECTION VII - OVERHAUL & PARTS INFORMATION

WARNING

Before breaking a circuit connection, make sure that power is off and system pressure is released. Lower all vertical cylinders, discharge accumulators, and block any load that could generate pressure.

CAUTION

Absolute cleanliness is essential when working on a hydraulic system. Always work in a clean area. The presence of dirt and foreign materials in the system can result in serious damage or inadequate operation.

NOTE

Discard and replace all o-rings, gaskets, and back-up rings removed during disassembly.

A. Service Tools

The following service tools are required to overhaul a cartridge valve.

1. A torque wrench with hex bit adapters. Refer to Table 9 for appropriate torque wrench values.

Table 9. Torque Requirements

Cover Size	Mounting Screw
16mm	35
25mm	110
32mm	285
40mm	500
50mm	580
63mm	1200
	890

2. A set of U.S.A. and metric hex key wrenches
3. A set of small pin punches
4. A 3/8 inch ratchet with sockets
5. A small ball peen hammer
6. A 1 inch micrometer
7. A suitable piece of hardwood or nylon block to install sleeve
8. A suitable extractor tool to remove insert poppet and sleeve

B. Cartridge Cover Disassembly & Assembly

Perform the following steps:

1. Locate the appropriate cover assembly figure number from the following listing (page 22 & 23). Refer to exploded view drawings 18 through 27 when ordering replacement parts.

2. If required, remove the pilot valve from top of cover assembly.
3. Remove the cover from the manifold block.
4. Disassemble the cover according to item number sequence order.
5. Inspect the cover parts for damage or excessive wear. Make sure all orifices are open and free from dirt. If a new orifice plug is required, refer to Table 10 and obtain an orifice kit. Orifices have been redesigned from a screwdriver slot to hex head.

Color/Size	Valve Size (mm)
Red 0.5	635132
White 0.6	635133
Green 0.7	635134
Blue 0.8	635135
Purple 0.9	635153
Yellow 1.0	635136
Pink 1.1	635137
Orange 1.2	635138
Violet 1.3	635139
Brown 1.4	635140
Grey 1.5	635141

* Orifice Kit	* Solid Plug	* Orifice Kit
635173	635152	635151
635174	635154	635155
635175	635156	635157
635176	635159	635175
635177		635177
635178		635178
635179		635179
635180		635180
675958		675958
675169	812	675169
926283		926283

* Included in Orifice Kit (quan. 3 per kit)
NOTE: Orifices available only in kits. Kits contain 3 of each size. Threads are inch and orifice diameter is millimeter.

Table 10. Orifice Kits

NOTE

If a complete cover assembly is required, obtain a new cover assembly by the model code that is stamped on the cover nameplate.

NOTE

Cover assemblies that have an NFPA-D03 interface were formally designated as NFPA-D01. Cover assemblies that have an NFPA-D05 interface were formally designated as NFPA-D02.

Parts Figure No.	Cover Type	Functional Symbol	Cover Assembly Model Code
18	Directional with Locknut Adj.		CVCS--N-S2-10
	Directional with Micrometer Adj.		CVCS--A-S2-W-10
	Directional with Micrometer/Key Adj.		CVCS--A-S2-M-10
19	Directional with Locknut Adj.		CVCS--A-S2-W-10
	Directional with Micrometer Adj.		CVCS--A-S2-M-10
20	Directional with NFFA-D03 Interface		CVCS--D1-S2-10
	Directional with NFFA-D05 Interface		CVCS--D2-S2-10
21	Directional with NFFA-D03 Interface & Locknut Adj. (NO-Normally Open Function Shown)		CVCS--AD1-S2-W-10-NC
	Directional with NFFA-D03 Interface (NO-Normally Open Function Shown)		CVCS--AD1-S2-W-10-NO
22	Shuttle		CVCS--W-S2-10
23	Shuttle with NFFA-D03 Interface (W1 Function Shown)		CVCS--W11-S2-10
23a	Shuttle with NFFA-D03 Interface (W31)		CVCS--W31-S2-10
24	Pilot Operated Check		CVCS--PC-S2-10
25	Pressure Relief with Locknut Adj.		CVCS--C-S2-W-***-10
	Pressure Relief with Micrometer Adj.		CVCS--C-S2-M-***-10
	Pressure Relief with Micrometer/Key		CVCS--C-S2-K-***-10
25	Pressure Relief with NFFA-D03 Interface & Locknut Adj.		CVCS--C1-S2-W-***-10
	Pressure Relief Interface & Micrometer Adj.		CVCS--C1-S2-M-***-10

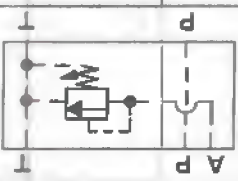
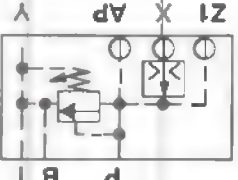
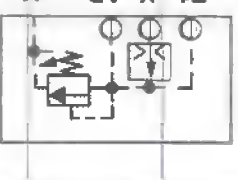
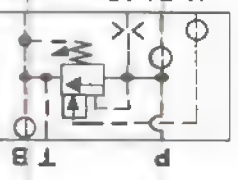
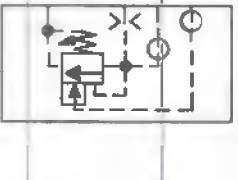
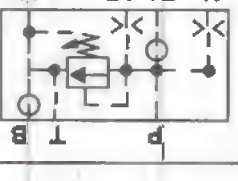
		○ > - Standard orifice location ○ > - Tapped port for installation of an additional orifice	
28	Pressure Relief Module		CVGC-3-**-***-10
27	Pressure Reducing with NFPA-D03 Interface & Micrometer/key Adj.		CVCS-**-X1-S2-K-***-10
	Pressure Reducing with NFPA-D03 Interface & Micrometer Adj.		CVCS-**-X1-S2-M-***-10
	Pressure Reducing with NFPA-D03 Interface & Locknut Adj.		CVCS-**-X1-S2-W-***-10
27	Pressure Reducing with NFPA-D03 Interface & Micrometer/key Adj.		CVCS-**-X-S2-K-***-10
	Pressure Reducing with Micrometer Adj.		CVCS-**-X-S2-M-***-10
	Pressure Reducing with Locknut Adj.		CVCS-**-X-S2-W-***-10
26	Unloading with NFPA-D03 Interface & Micrometer/key Adj.		CVCS-**-U1-S2-K-***-10
	Unloading with NFPA-D03 Interface & Micrometer Adj.		CVCS-**-U1-S2-M-***-10
	Unloading with NFPA-D03 Interface & Locknut Adj.		CVCS-**-U1-S2-W-***-10
26	Unloading with Micrometer/key Adj.		CVCS-**-U-S2-K-***-10
	Unloading with Micrometer Adj.		CVCS-**-U-S2-M-***-10
	Unloading with Locknut Adj.		CVCS-**-U-S2-W-***-10
25	Pressure Relief with NFPA-D03 Interface & Micrometer/key Adj.		CVCS-**-C1-S2-K-***-10

Figure 18. Parts Tabulation

Note: 1 lb. ft. = .74 Nm.
 ▲ - Included in seal kit (Table 13)
 ■ - Not available for sale
 * - Refer to Table 10 for other orifice sizes

Item No.	Part Description	Size (mm)			
		16	25	32	40
1	Bolt Kit - inch	590700	590704	590713	590706
	- mm	590701	590705	590718	590707
	Torque to (lb. ft.)	(26)	(80)	(210)	(370)
2	Screw (2 Req'd)	36212	36212	36212	36212
3	Nameplate	199082	199082	199082	199082
4	Roll Pin	168319	226797	226797	226797
5	Plug	398071	398071	398071	398071
	Torque to (lb. ft.)	(7.4)	(7.4)	(7.4)	(7.4)
6	Orifice Plug (Std.)	635136	635156	635157	635158
7	Cover	580013	580056	730408	580094
8	O-Ring	262330	262331	262332	262334
9	Back-up Ring	277652	277707	277712	277716
10	O-Ring	262360	262401	262406	262410
11	O-Ring	263492	263492	263492	263496

Figure 18. Directional Cover Assembly (N Function)

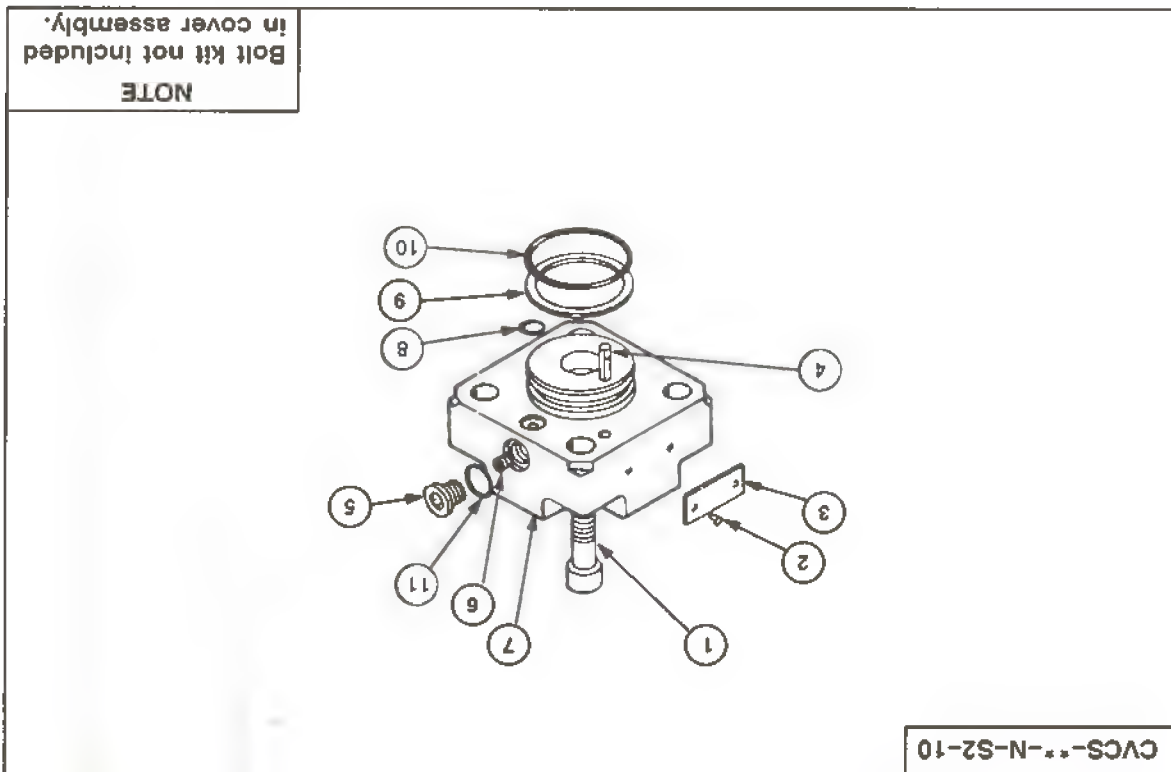
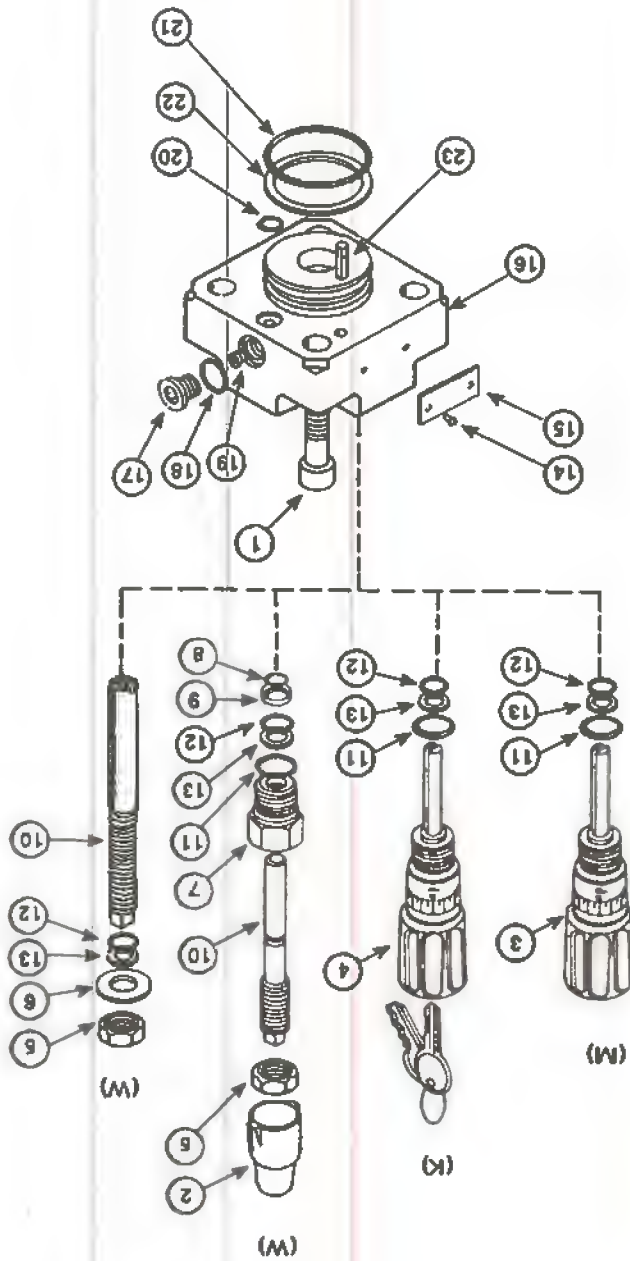


Figure 19. Directional Cover Assembly with Stroke Adjuster (A Function)

NOTE
Bolt kit not included
in cover assembly.



CVCS--A-S2--10

Figure 19. Parts Tabulation

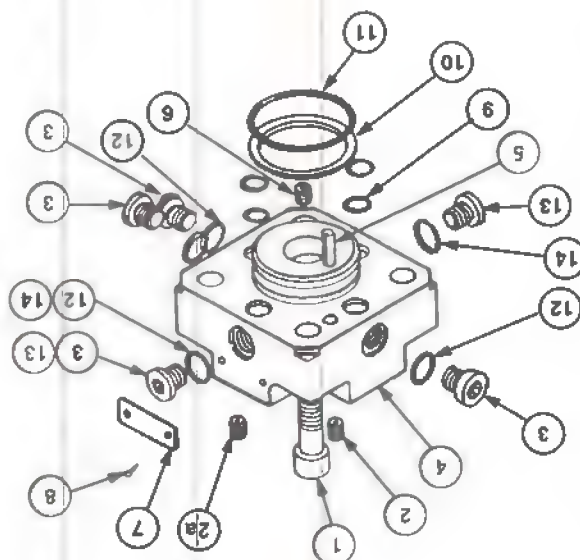
- ▲ - Included in seal kit (Table 13)
 ◆ - Included in adjuster rod kit 941472 (16, 25mm only)
 * - Refer to Table 10 for other orifice sizes
 ■ - Not available for sale

Note: 1 lb. ft. = 1.36 Nm.

Item No.	Part Description	16	25	32	40	50	63
1	Bolt Kit - inch	590700	590704	590713	590706	590708	590710
	- mm	590701	590705	590718	590707	590709	590711
	Torque to (lb. ft.)	(26)	(80)	(210)	(370)	(430)	(890)
◆ 2	Cap	762607	762607	—	—	—	—
3	Micrometer S/A (M)	637458	637460	—	—	—	—
4	Micrometer/key S/A (K)	637459	637461	—	—	—	—
◆ 5	Lock Nut	761190	761190	688469	761190	763770	763727
6	Washer	—	—	688471	763690	763726	688471
◆ 7	Adaptor	579922	579922	—	—	—	—
	Torque to (lb. ft.)	(81)	(81)	—	—	—	—
8	Circlip	762487	762487	—	—	—	—
9	Retaining Ring	762488	762488	—	—	—	—
◆ 10	Adjuster Rod	764458	764459	730407	579926	589151	589152
▲ 11	O-Ring	262355	262355	—	—	—	—
▲ 12	O-Ring	262350	262350	262349	262350	262390	262392
▲ 13	Back-up Ring	197588	197588	197587	197588	197628	197630
14	Screw (2 Req'd)	36212	36212	36212	36212	36212	36212
15	Nameplate	199082	199082	199082	199082	199082	199082
■ 16	Cover	580014	580057	730409	580095	589108	589131
17	Plug	398071	398071	398071	398071	315932	315932
	Torque to (lb. ft.)	(7.4)	(7.4)	(7.4)	(7.4)	(22)	(22)
▲ 18	O-Ring	263492	263492	263492	263492	263496	263496
* 19	Orifice (Std.)	635136	635156	635157	635158	635177	635178
▲ 20	O-Ring	262330	262331	262332	262334	262334	262354
▲ 21	O-Ring	262360	262401	262406	262410	262467	262476
▲ 22	Back-up Ring	277652	277707	277712	277716	277781	277790
23	Roll Pin	168319	226797	226797	226797	195940	195940

Valve Size (mm)

CVCS--D1-S2-10
CVCS--D2-S2-10



NOTE
Bolt kit not included
in cover assembly.

Figure 20. Directional Cover Assembly with NFA-D03 / NFA-D05 Interface (D1 & D2 Function)

Item No.	Part Description	Valve Size (mm)			
		16	25	32	40
1	Bolt Kit - Inch	590700	590704	590713	590706
	- mm	590701	590705	590718	590707
	Torque to (lb. ft.)	(26)	(80)	(210)	(370)
		(430)	(890)		
2	Orifice (Std.)	635136	635156	635157	635158
2a	Plug	812	812	812	812
3	Plug (Qty.)	398071 (4)	398071 (4)	398071 (4)	398071 (4)
	Torque to (lb. ft.)	(7.4)	(7.4)	(7.4)	(7.4)
4	Cover (NFA-D03)	517257	731025	476658	477364
	Cover (NFA-D05)	168319	226797	226797	226797
5	Roll Pin	168319	226797	226797	226797
6	Orifice (Std.)	168319	226797	226797	226797
7	Nameplate	199082	199082	199082	199082
8	Screw (2 Req'd)	AX-36212	AX-36212	AX-36212	AX-36212
9	O-Ring (4 Req'd)	262330	262331	262332	262334
10	Back-up Ring	277652	277707	277712	277716
11	O-Ring	262360	262401	262406	262410
12	O-Ring	263492	263492	263492	263492
13	Plug (2 Req'd)	343740	343740	343740	343740
14	O-Ring	263494	263494	263494	263494

Note: 1 lb. ft. = .136 Nm.

▲ - Included in seal kit (Table 13)

■ - Not available for sale

* - Refer to Table 10 for other orifice sizes

Figure 20. Parts Tabulation

▲ - Included in seal kit (Table 13)
 ▲ - Not available for sale

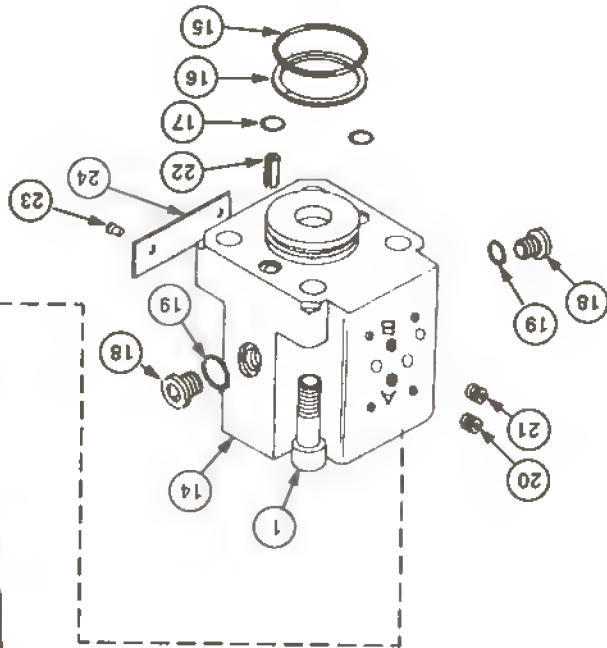
Figure 21. Parts Tabulation

Item No.	Part Description	Valve Size (mm)
24	Nameplate	199082
23	Screw (2 Req'd)	36212
22	Roll Pin	226797
* 21	Orifice (NC) @ A Port	635156
20	Plug (NC) @ B Port	812
* 21	Orifice (NO) @ B Port	635156
20	Plug (NO) @ A Port	812
▲ 19	O-Ring (2 Req'd)	263492
18	Torque to (lb. ft.)	(7.4)
17	Plug (2 Req'd)	398071
▲ 16	O-Ring (2 Req'd)	262331
▲ 15	Back-up Ring	277707
14	Cover	262401
25	Valve Size (mm)	684793
40		262410

Item No.	Part Description	Valve Size (mm)
1	Bolt Kit - inch	590704
2	Cap	762607
3	Micrometer S/A (M)	730236
4	Micrometer/key S/A (K)	730235
5	Lock Nut	761190
6	Washer	761192
7	Adaptor	579922
8	Circclip	762487
9	Retaining Ring	762488
10	Adjuster Rod	730128
11	O-Ring	262355
12	O-Ring	262350
13	Back-up Ring	197588

Note: 1 lb ft. = 1.36 Nm.

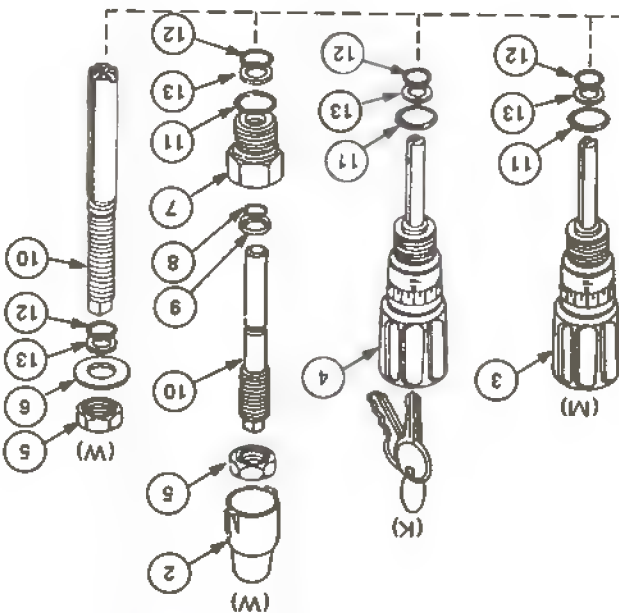
Figure 21. Directional Cover Assembly with NFPA-D03 Interface and Stroke Adjuster (AD1 Function)

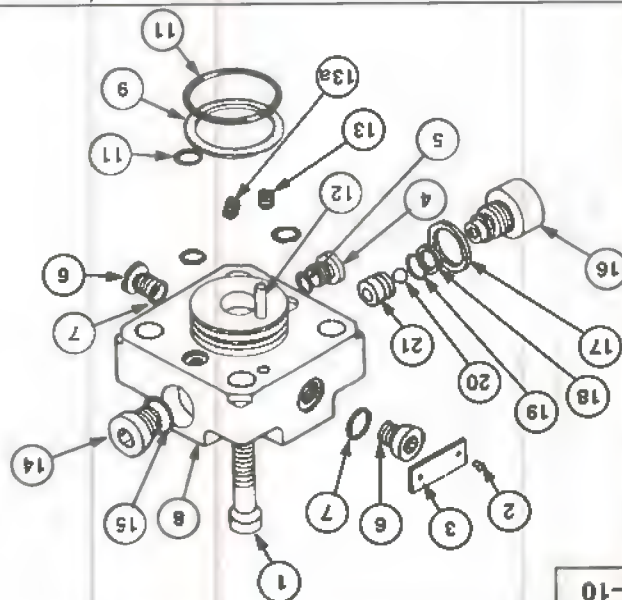


CVCS--AD1-S2--10-NC
 CVCS--AD1-S2--10-NO

NOTE
 Bolt kit not included in cover assembly.

NOTE
 NO (Normally Open) Plug (20) & Orifice (21) orientation shown. Reverse Plug (20) & Orifice (21) for NC (Normally Closed) operation.





Item No.	Part Description	Part No.
16	Plug	760881
	Torque (lb. ft.) (75)	
▲ 17	USIT Ring	763633
▲ 18	Back-up Ring	580550
▲ 19	O-ring	262333
20	Ball	1651
21	Seat	760882

NOTE
Bolt kit not included
in cover assembly.

Figure 22. Shuttle Cover Assembly (W Function)

Item No.	Part Description	16	25	32	Valve Size (mm)
1	Bolt Kit - inch	590700	590704	590713	590706
	- mm	590701	590705	590718	590707
	Torque to (lb. ft.)	(26)	(81)	(210)	(370)
2	Screw (2 Req'd)	AX-36212	AX-36212	AX-36212	AX-36212
3	Nameplate	199082	199082	199082	199082
4	Plug	—	—	398071	398071
	Torque to (lb. ft.)	—	—	(7.4)	(7.4)
▲ 5	O-Ring	—	—	263492	263492
6	Plug (2 Req'd)	398071	398071	398071	398071
	Torque to (lb. ft.)	(7.4)	(7.4)	(7.4)	(7.4)
▲ 7	O-Ring (2 Req'd)	263492	263492	263492	263492
8	Cover	517259	477102	476660	477366
▲ 9	Back-up Ring	277652	277707	277712	277716
▲ 10	O-Ring	262360	262401	262406	262410
▲ 11	O-Ring (3 req'd)	262330	262331	262332	262334
12	Roll Pin	168319	226797	226797	226797
* 13	Orifice (Std.)	635136	635156	635157	635158
⊕ 13a	Solid Plug	—	—	812	812
14	Plug	—	—	315932	315932
	Torque to (lb. ft.)	—	—	(22)	(22)
▲ 15	O-Ring	—	—	263496	263496
16-21	See Fig. 22 Shuttle Cover Assy.	16, 25, 32, 40mm			

Note: 1 lb. ft. = 1.36 Nm.

▲ - Included in seal kit (Table 13)

■ - Not available for sale

* - Refer to Table 10 for other orifice sizes

⊕ - Do Not Remove

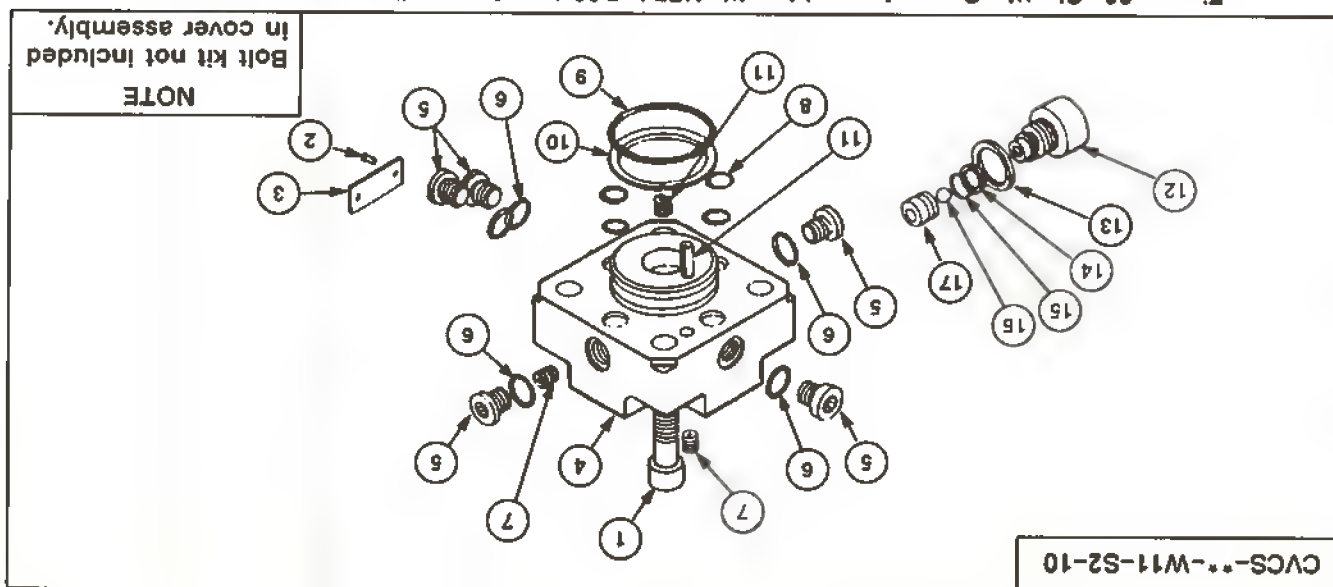
Figure 22. Parts Tabulation

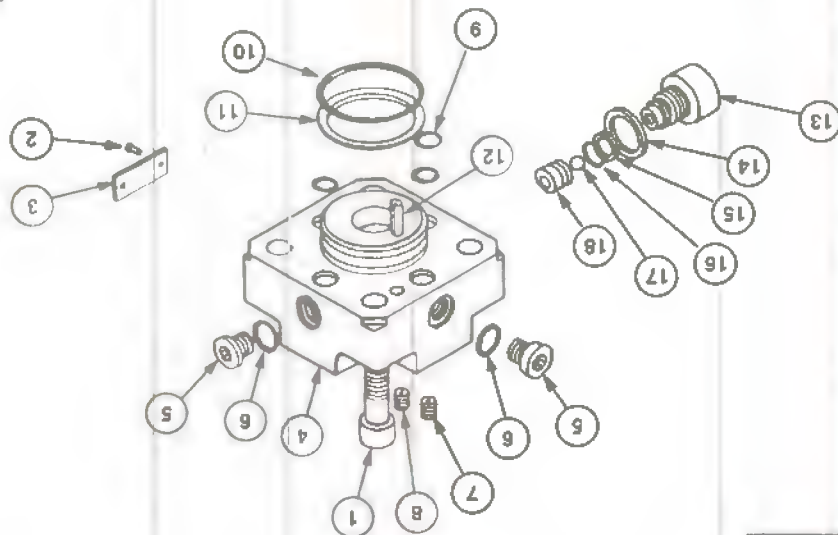
Figure 23. Parts Tabulation

Note: 1 lb. ft. = 1.36 Nm.
 ▲ - Included in seal kit (Table 13)
 ■ - Not available for sale
 * - Refer to Table 10 for other
 orifice sizes.
 ⊕ - Do Not Remove

Item No.	Part Description	16	25	32	40
1	Bolt Kit - inch	590700	590704	590713	590706
	- mm	590701	590705	590718	590707
	Torque to (lb. ft.)	(26)	(81)	(210)	(370)
2	Screw (2 Req'd)	AX-36212	AX-36212	AX-36212	AX-36212
3	Nameplate	199082	199082	199082	199082
4	Cover	517260	477103	476656	477367
5	Plug (Qty.)	398071 (4)	398071 (4)	398071 (5)	398071 (5)
	Torque to (lb. ft.)	(7.4)	(7.4)	(7.4)	(7.4)
6	O-Ring (Qty.)	263492 (4)	263492 (4)	263492 (5)	263492 (5)
*	Orifice (Std.)	635136	635156	635157	635158
8	O-Ring (4 Req'd)	262330	262331	262332	262334
9	O-Ring	262360	262401	262406	262410
10	Back-up Ring	277652	277707	277712	277716
11	Roll Pin	168319	226797	226797	226797
12	Plug	760881	760881	760881	760881
	Torque to (lb. ft.)	(75)	(75)	(75)	(75)
13	USIT Ring	763633	763633	763633	763633
14	Back-up Ring	580550	580550	580550	580550
15	O-Ring	262333	262333	262333	262333
16	Ball	1651	1651	1651	1651
17	Seat	760882	760882	760882	760882

Figure 23. Shuttle Cover Assembly with NFA-D03 Interface (W11 Function)





NOTE
Bolt kit not included
in cover assembly.

Figure 23a. Shuttle Cover Assembly with NFPA-D03 Interface (W31 Function)

Item No.	Part Description	16	25	32	40
1	Bolt Kit - Inch	590700	590704	590713	590706
	- mm	590701	590705	590718	590707
	Torque to (lb. ft.)	(26)	(81)	(210)	(370)
2	Screw (2 Req'd)	36212	36212	36212	36212
3	Nameplate	199082	199082	199082	199082
4	Cover	517261	477104	476657	477368
5	Plug (Qty.)	398071(1)	398071(2)	398071(2)	398071(2)
	Torque to (lb. ft.)	(7.4)	(7.4)	(7.4)	(7.4)
6	O-Ring (Qty.)	263492(1)	263492(2)	263492(2)	263492(2)
7	Plug (@ 'B')	35633	812	812	812
8	Orifice (Std.) (@ 'A')	635136	635156	635157	635158
9	O-Ring (3 Req'd)	262330	262331	262332	262334
10	O-Ring	262360	262401	262406	262410
11	Back-up Ring	277652	277707	277712	277716
12	Roll Pin	168319	226797	226797	226797
13	Plug	760881	760881	760881	760881
	Torque to (lb. ft.)	(75)	(75)	(75)	(75)
14	USIT Ring	763633	763633	763633	763633
15	Back-up Ring	580550	580550	580550	580550
16	O-Ring	262333	262333	262333	262333
17	Ball	1651	1651	1651	1651
18	Seat	760882	760882	760882	760882

Note: 1 lb. ft. = 1.36 Nm.

▲ - Included in seal kit (Table 13)

■ - Not available for sale

* - Refer to Table 10 for other orifice sizes.

Figure 23a. Parts Tabulation

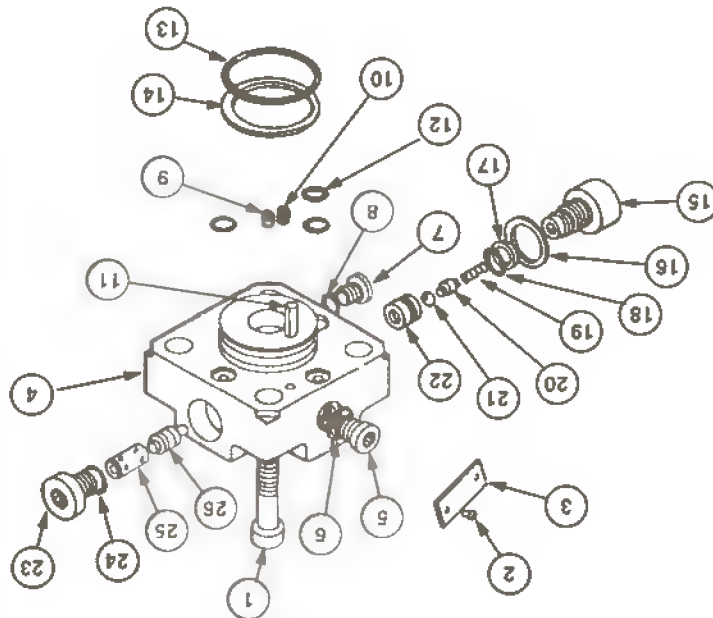
Figure 24. Parts Tabulation

▲ - Included in seal kit (Table 13)
 ■ - Not available for sale
 * - Refer to Table 10 for other orifice sizes
 ⊕ - Do not remove.

Note: 1 lb. ft. = 1.36 Nm.

Item No.	Part Description	16	25	32	40
1	Bolt Kit - inch	590700	590704	590713	590706
	- mm	590701	590705	590718	590707
	Torque to (lb. ft.)	(26)	(80)	(210)	(370)
2	Screw (2 Req'd)	36212	36212	36212	36212
3	Nameplate	199082	199082	199082	199082
4	Cover	517258	477101	476659	477365
5	Plug	398071	398071	398071	398071
	Torque to (lb. ft.)	(7.4)	(7.4)	(7.4)	(7.4)
6	O-Ring	263492	263492	263492	263492
7	Plug	—	—	—	398071
	Torque to (lb. ft.)	—	—	—	(7.4)
8	O-Ring	—	—	—	263492
9	Orifice (Std.)	635136	635156	635157	635158
10	Plug	—	—	812	812
11	Roll Pin	168319	226797	226797	226797
12	O-Ring (3 Req'd)	262330	262331	262332	262334
13	O-Ring	262360	262401	262406	262410
14	Back-up Ring	277652	277707	277712	277716
Item No.	Part Description	16	25	32	40
15	Plug	760881	—	—	—
	Torque (lb. ft.)	(75)	—	—	—
16	USIT Ring	763633	—	—	—
17	Back-up Ring	580550	—	—	—
18	O-Ring	262333	—	—	—
19	Spring	544103	—	—	—
20	Spool	760889	—	—	—
21	Ball	1651	—	—	—
22	Seat	760882	—	—	—
23	Plug	315932	—	—	—
	Torque (lb. ft.)	(22)	—	—	—
24	O-Ring	263496	—	—	—
25	Spacer (16mm)	Omit	—	—	—
	Spacer (25mm)	Omit	—	—	—
	Spacer (32mm)	730435	—	—	—
	Spacer (40mm)	761506	—	—	—
26	Pilot Spool (16mm)	867947	—	—	—

Figure 24. Pilot Operated Check Cover Assembly (PC Function)



CVCs--PC-S2-10

NOTE
Bolt kit not included
in cover assembly.

Item No.	Part Description	Valve Size (mm)	16	25	32	40
1	Bolt Kit - inch	590702	590704	590713	590706	590706
	Bolt Kit - mm	590703	590705	590718	590707	590707
	Torque to (lb. ft.)	(26)	(80)	(210)	(370)	
2	Cap	762607	762607	762607	762607	762607
3	Lock Nut	761190	761190	761190	761190	761190
4	Adjusting Rod	762918	762918	762918	762918	762918
5	Adaptor	579922	579922	579922	579922	579922
	Torque to (lb. ft.)	(75)	(75)	(75)	(75)	(75)
6	Keys (1 set of 2)	814573	814573	814573	814573	814573
7	Micrometer/key S/A (K)	637463	637463	637463	637463	637463
8	Micrometer S/A (M)	637462	637462	637462	637462	637462
9	O-Ring	262335	262335	262335	262335	262335
10	O-Ring	262350	262350	262350	262350	262350
11	Back-up Ring	197588	197588	197588	197588	197588
12	Guide	762919	762919	762919	762919	762919
13	Shims	762920	762920	762920	762920	762920
14	Spring (125 bar)	762928	762928	762928	762928	762928
	Spring (245 bar)	762929	762929	762929	762929	762929
	Spring (350 bar)	762930	762930	762930	762930	762930
15	Washer	762921	762921	762921	762921	762921
16	Poppet	290057	290057	290057	290057	290057

Figure 25. Parts Tabulation

Figure 25. Pressure Relief Cover Assembly (C & Ct Function)

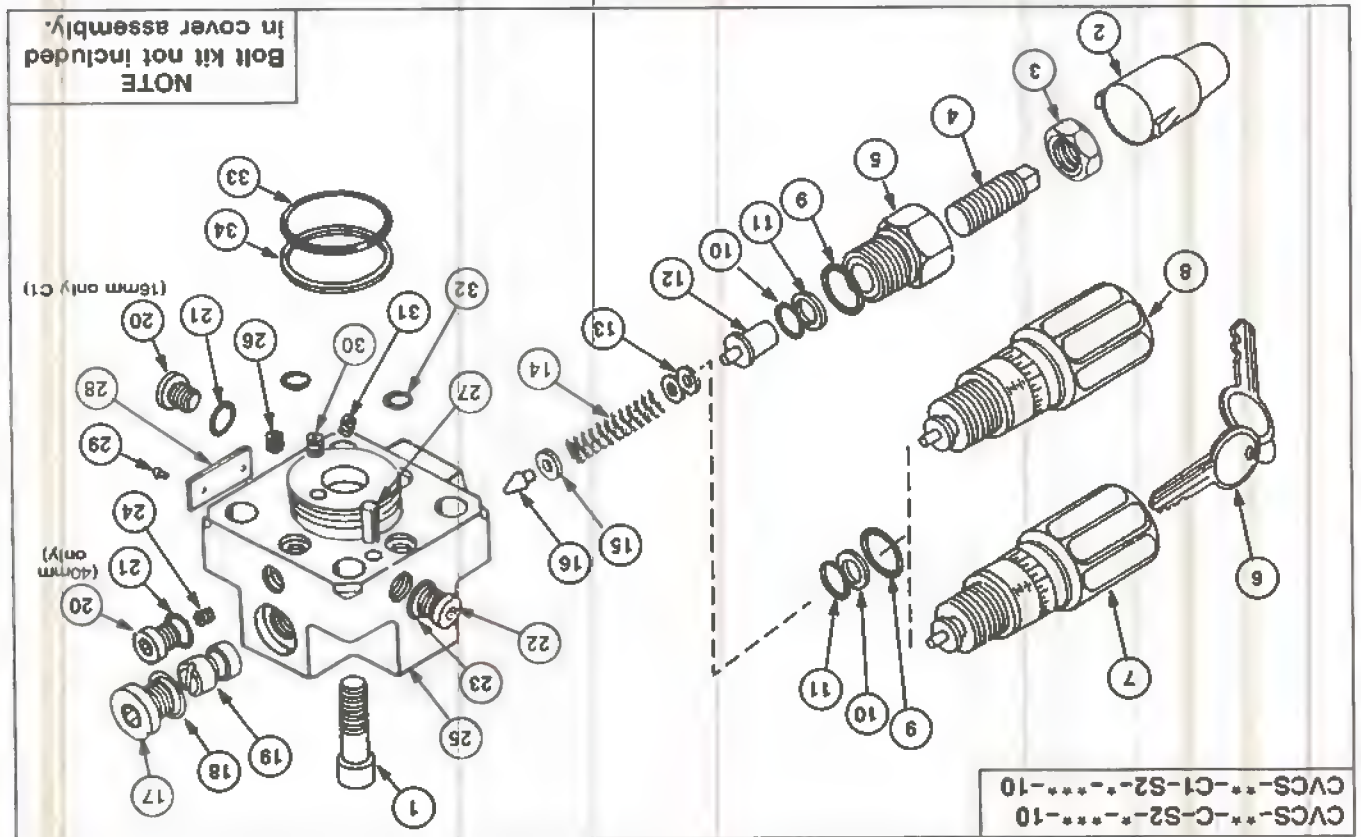


Figure 25. Parts Tabulation (Continued)

Item No.	Part Description	Valve Size (mm)			
		16	25	32	40
17	Plug	329463	329463	329463	329463
	Torque to (lb. ft.)	(42)	(42)	(42)	(42)
▲ 18	O-Ring	263497	263497	263497	263497
● 19	Seat	762922	762922	762922	762922
20	Plug	398071	398071	398071	398071
	Torque to (lb. ft.)	(7.4)	(7.4)	(7.4)	(7.4)
▲ 21	O-Ring	263492	263492	263492	263492
22	Plug	398071	—	—	398071
	Torque to (lb. ft.)	(7.4)	—	—	(7.4)
▲ 23	O-Ring	—	—	—	263492
* 24	Orifice (Std)	—	—	—	635154
■ 25	Cover (Type C)	579982	580266	731077	580327
	Cover (Type C1)	730455	580265	731078	580326
* 26	Orifice (Std)	635135	635152	635153	—
27	Roll Pin	168319	226797	226797	226797
28	Nameplate	199082	199082	199082	199082
29	Screw (2 Req'd)	36212	36212	36212	36212
⊕ 30	Plug	—	—	—	812
* 31	Orifice (Std.)	635138	635156	635158	635159
▲ 32	O-Ring (3 Req'd)	262330	262331	262332	262334
▲ 33	O-Ring	262360	262401	262406	262410
▲ 34	Back-up Ring	277652	277707	277712	277716

Note: 1 lb. ft. = 1.36 Nm.

14.5 psi = 1 bar

▲ - Included in seal kit (Table 13)

■ - Not available for sale

* - Refer to Table 10 for other orifice sizes

◆ - Included in adjuster rod kit 941472

● - Included in poppet kit 941473

⊕ - Do Not Remove

Item No.	Part Description	Valve Size (mm)
2	Cap	762607
3	Lock Nut	764177
4	Adaptor Torque to (lb. ft.)	679692 (75)
5	Adjusting Rod	764176
6	Keys (1 set of 2)	814573
7	Micrometer/Key S/A (K)	637463
8	Micrometer S/A (M)	637462
▲ 9	O-Ring	262355
▲ 10	O-Ring	262350
▲ 11	Back-up Ring	197588
● 12	Shims	762920
13	Spring (125 bar)	762928
	Spring (245 bar)	762929
	Spring (350 bar)	762930
● 14	Washer	762921
● 15	Poppet	290057
16	Plug Torque to (lb. ft.)	329463 (42)
▲ 17	O-Ring	263497
● 18	Plunger	815031
● 19	Seat	815030
20	Plug Torque to (lb. ft.)	398071 (7.4)
21	O-Ring	263492

Item No.	Part Description	16	25	32	40
1	Bolt Kit - inch	590702	590704	590713	590706
	- mm	590703	590705	590718	590707
22	Plug Torque to (lb. ft.)	(26)	(80)	(210)	(370)
	Plug	398071	—	—	398071
23	O-Ring Torque to (lb. ft.)	(7.4)	—	—	(7.4)
	O-Ring	—	—	—	263492
24	⊖ Plug	—	—	—	812
25	Office (Standard)	635138	635156	635157	635158
26	■ Cover (Type U) Cover (Type U)	579982	580266	731077	580327
	O-Ring (3 Req'd)	262330	262331	262332	262334
27	▲ O-Ring	262360	262401	262406	262410
28	▲ O-Ring	262360	262401	262406	262410
29	▲ Back-up Ring	277652	277707	277712	277716
30	Roll Pin	168319	226797	226797	226797
31	Screw (2 Req'd)	36212	36212	36212	36212
32	▶ Namplate	199082	199082	199082	199082

Note: 1 lb. ft. = 1.36 Nm.
14.5 psi = 1 bar.

- ▲ - Included in seal kit (Table 13)
- - Included in poppet kit 926591
- - Not available for sale
- ⊖ - Do Not Remove
- * - Refer to Table 10 for other orifice sizes

Figure 26. Unloading Cover Assembly (U & U1 Function)

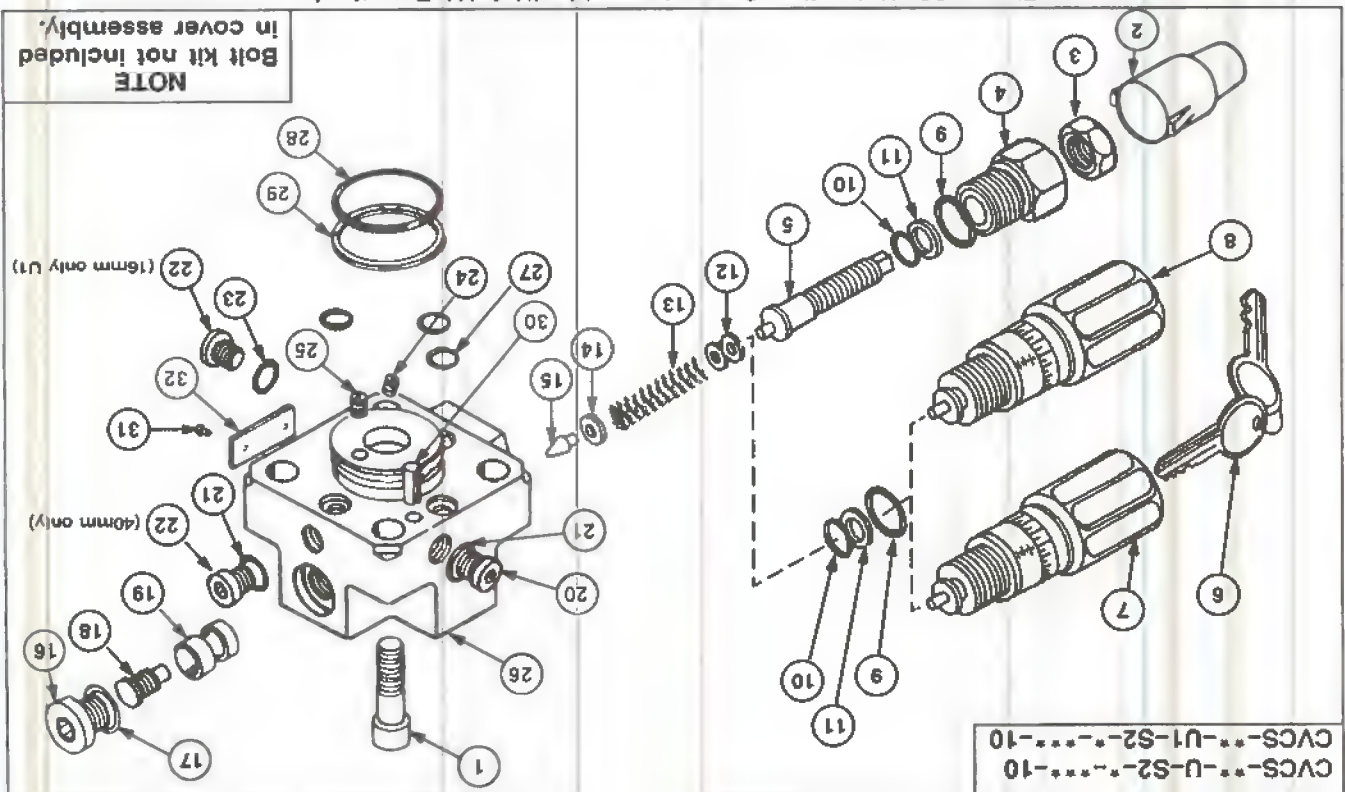


Figure 27. Parts Tabulation

NOTE: 1 lb.ft. = 1.36 Nm.
 14.5 psi = 1 bar
 ▲ Included in Seal Kit (Table 13)
 ◆ Included in Adjuster Rod Kit 926227
 ■ Not Available for Sale

Item No.	Part Description	Valve Size(mm)	16	25
1	Bolt Kit - inch	590702	590704	590705
	Torque to (lb.ft.)	(26)	(81)	
2	Cap	762607	762607	
3	Lock Nut	764177	764177	
4	Adapter	579692	579692	
5	Adjuster Rod	764176	764176	
6	O-Ring	262350	262350	
7	Back-Up Ring	197588	197588	
8	O-Ring	262355	262355	
9	Micrometer/keys/A (K)	637463	637463	
10	Keys (1 set of 2)	814573	814573	
11	Micrometer (M)	637462	637462	
12	Shims	762920	762920	
13	Spring (125 bar)	762928	762928	
	Spring (245 bar)	762929	762929	
	Spring (350 bar)	762930	762930	
14	Washer	762921	762921	
15	Poppet	290057	290057	
16	Plug	579921	579921	
	Torque to (lb.ft.)	(42)	(42)	
17	O-Ring	263497	263497	
18	Spool	764172	764172	
19	Spring	544103	544103	
20	Seat	764171	764171	
21	Plug	398071	398071	
	Torque to (lb.ft.)	(7.4)	(7.4)	
22	O-Ring	263492	263492	
23	Cover (Type X)	579982	579982	
	Cover (Type X1)	730455	730455	
24	Roll Pin	168319	168319	
25	Screw (2 Req'd)	36212	36212	
26	Nameplate	199082	199082	
27	O-Ring (3 Req'd)	262330	262330	
28	O-Ring	262360	262360	
29	Back-Up Ring	271732	271732	

Figure 27. Pressure Reducing Cover Assembly (X & X1 Function)

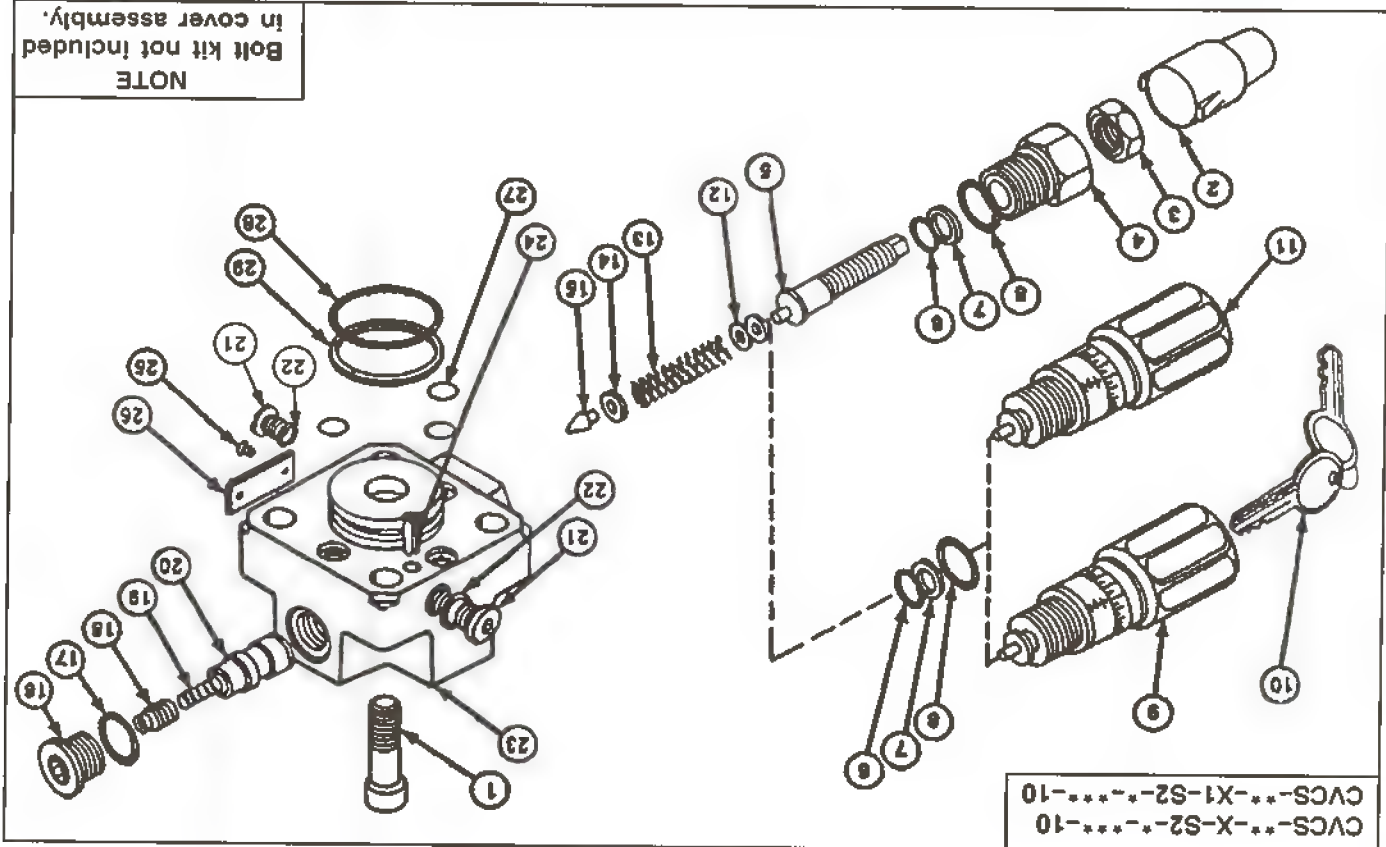


Figure 28. Parts Tabulation

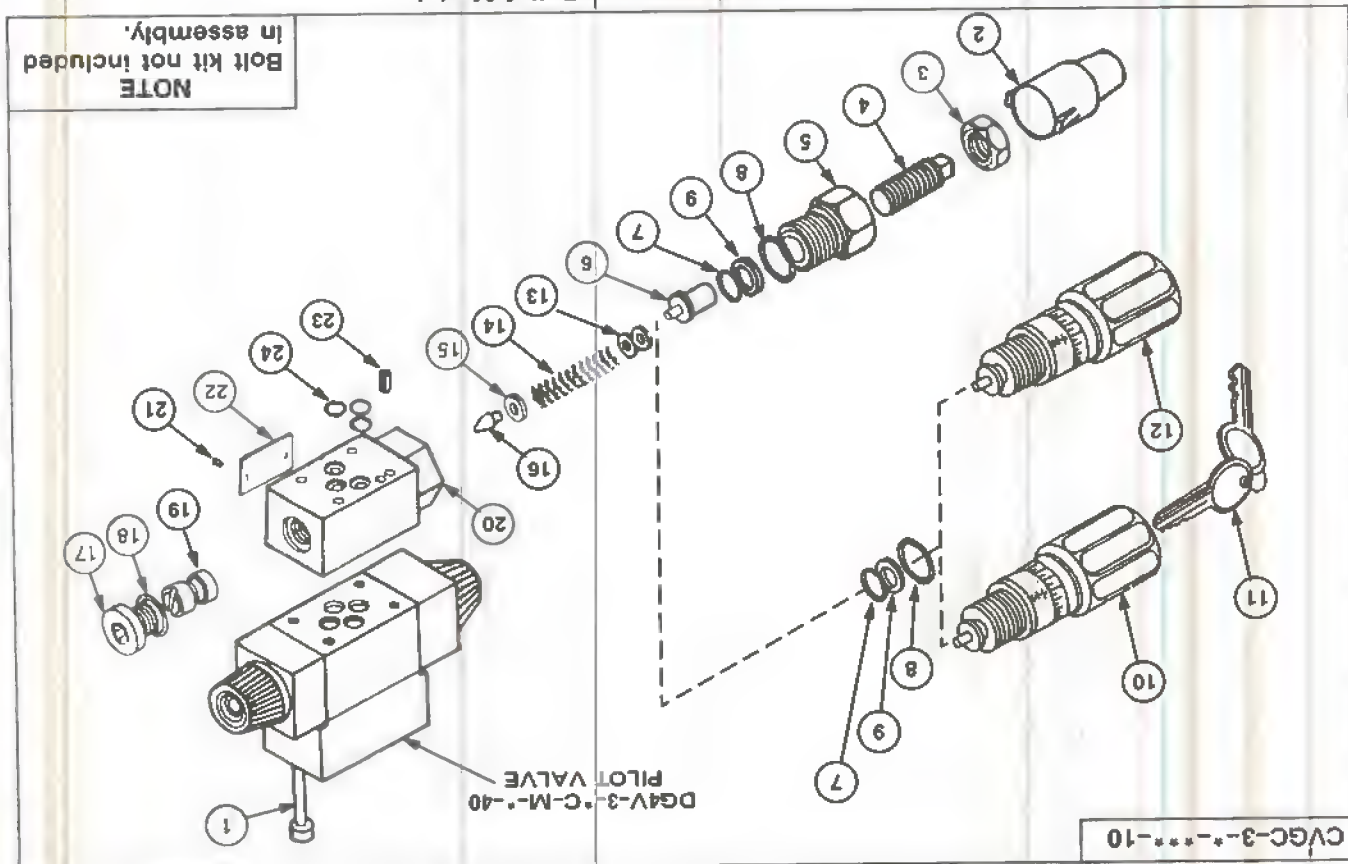
Note:
To obtain a complete
CVGC module, order
by the model code on
the nameplate.

- ▲ - Included in seat kit 920258
- ◆ - Included in adjuster rod kit 941472
- - Included in poppet kit 941473
- - Not available for sale

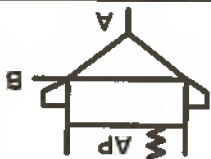
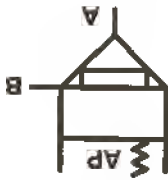
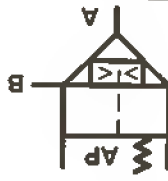
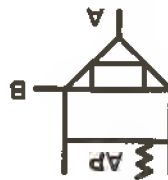
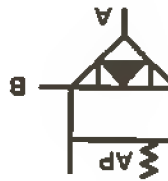

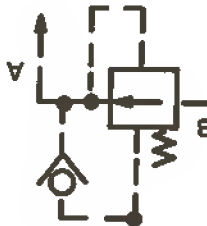
Note: 1 lb. ft. = 1.36 Nm.
14.5 psi = 1 bar

Item No.	Part Description	Part No.	Item No.	Part Description	Part No.
1	Bolt kit (See Appendix)	762607	14	Spring (125 bar)	762928
2	Cap	761190	15	Spring (250 bar)	762929
3	Lock Nut	762918	16	Spring (350 bar)	762930
4	Adjuster Rod	579922	17	Washer	290057
5	Adaptor	762919	18	Poppet	329463
6	Guide	762350	19	Plug	(42)
7	O-Ring	262355	20	Torque to (lb. ft.)	
8	O-Ring	197588	21	Torque to (lb. ft.)	
9	Back-up Ring	637463	22	O-Ring	263497
10	Micrometer/key S/A (K)	814573	23	Seat	762922
11	Keys (1 set of 2)	637462	24	Body	580036
12	Micrometer (M)	762920	25	Screw (2 req'd)	36212
13	Shims		26	Nameplate	199082

Figure 28. CVGC Pressure Relief Module



C. Cartridge Insert Disassembly & Assembly

Figure Number	Insert Type	Function	Functional Symbol	Insert Model Code
31	Directional	D10		CVI--D10-2-- CVI--D10-2-L-- CVI--D10-2-M-- CVI--D10-2-H--
31	Directional	D11		CVI--D11-2-L-- CVI--D11-2-M-- CVI--D11-2-H--
31	Directional with Orifice	D11		CVI--D11-2-L-- CVI--D11-2-M-- CVI--D11-2-H--
31	Directional	D20		CVI--D20-2-L-- CVI--D20-2-M-- CVI--D20-2-H--
31	Restrictor	R		CVI--R-2-L-- CVI--R-2-M-- CVI--R-2-H--
31	Flow Control	F		CVI--F-2-L-- CVI--F-2-M-- CVI--F-2-H--
32	Pressure Reducing	X		CVI--X1-2--

Perform the following steps. Refer to Figure 16.

1. Remove insert spring and determine the spring cracking pressure. Refer to Section V-C for instructions.

2. Use a suitable extractor and remove the poppet from the sleeve. Apply the extractor tool at the poppet groove as shown in Figure 29.

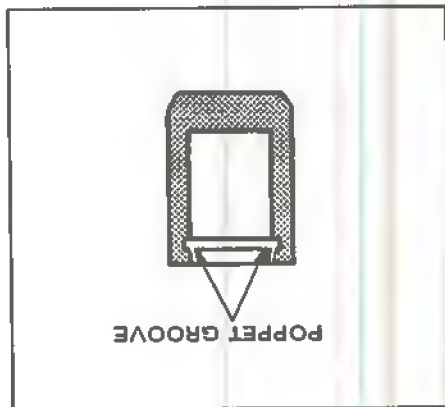


Figure 29. Insert Poppet

3. Determine poppet area ratio. Refer to Section V-C (Figure 17) for instructions.

4. Remove the sleeve from the manifold block. Apply a suitable extractor tool at the groove on smaller valve size (16mm through 32mm) pressure reducing inserts, or at the port holes for other inserts. See Figure 30. Apply the extractor tool to the two tapped holes on larger valve sizes (40mm through 63mm). See Figure 30a.

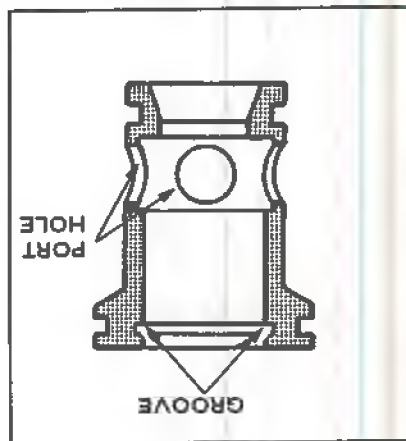


Figure 30a. Insert Sleeve
(40, 50, 63mm)

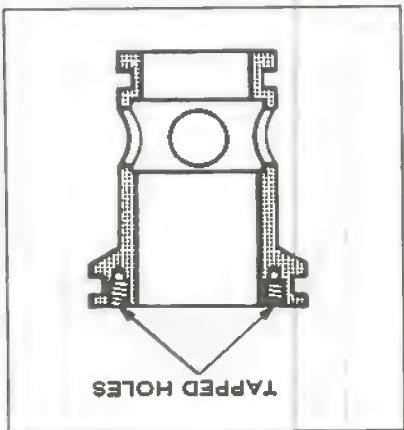


Figure 30. Insert Sleeve
(16, 25, 32mm)

5. Determine valve size by measuring largest diameter of sleeve. Refer to the number/letter code stamped on the sleeve or Section V-C.

6. Remove o-rings and back-up rings from sleeve.

7. Inspect insert parts for damage or excessive wear.

8. If required, obtain a new insert kit from Table 11. The insert kit contains a new sleeve, poppet, spring, and seals for the sleeve.

9. Refer to Table 12 if a new insert spring is required.

10. If a new insert kit is not required, obtain a new seal kit from table 13 and install o-rings and back-up rings on the sleeve. The seal kit includes all necessary seals for the sleeve and the cover assembly). Refer to Figure 16 for seal orientation.

11. Lubricate the seals with clean hydraulic fluid. Orient the sleeve port holes with the port holes inside the manifold block. Install the sleeve into the manifold block with a suitable piece of aluminum or nylon.

12. Install the poppet into sleeve.

13. Install the spring into poppet.

Table 11. Insert Kits

Note: 14.5 psi = 1 bar

Area Ratio	Crack Press. (psi)	Insert Kit Number					Model Code Insert
		16mm	25mm	32mm	40mm	50mm	63mm
1:1	33.4	995105	—	—	—	—	CVI--D10-2-11
1:1	33.4	995298	—	—	995144	—	CVI--D10-2-30
1:1	40.6	—	—	995080	—	—	CVI--D10-2-11
1:1.1	4.3	580019	580064	815250	589929	589111	CVI--D11-2-L-10
1:1.1	20.3	—	—	815241	—	—	CVI--D11-2-M-10
1:1.1	24.7	580020	580065	—	580026	589112	CVI--D11-2-M-10
1:1.1	36.3	580021	580066	—	579931	589113	CVI--D11-2-H-10
1:1.1	39.2	—	—	815242	—	—	CVI--D11-2-H-10
1:2	7.3	580022	580067	815243	579932	589114	CVI--D20-2-L-10
1:2	36.3	580023	580068	815244	579933	589115	CVI--D20-2-M-10
1:2	72.5	580024	580069	—	579934	589116	CVI--D20-2-H-10
1:2	72.5	580028	580073	815249	579938	—	CVI--D11-2-L-10
1:1.1	20.3	—	—	815250	—	—	CVI--D11-2-M-10
1:1.1	24.7	580029	580074	—	579939	—	CVI--D11-2-M-10
1:1.1	36.3	580030	580075	815251	579940	—	CVI--D11-2-H-10
1:2	7.3	580025	580070	815246	579935	589117	CVI--F-2-L-10
1:2	36.3	580026	580071	815247	579936	589118	CVI--F-2-M-10
1:2	72.5	—	—	—	579937	589119	CVI--F-2-H-10
1:2	7.3	675987	676004	479142	676194	455998	CVI--R-2-L-10
1:2	36.3	675988	676005	479143	676195	455999	CVI--R-2-M-10
1:2	72.5	675989	676006	479144	676196	455997	CVI--R-2-H-10
1:1	3.8	995103	995109	—	995108	—	CVI--D10-2-L-10
1:1	21.7	455919	995110	—	995104	—	CVI--D10-2-M-10
1:1	32.8	995105	995298	995080	995144	—	CVI--D10-2-H-10
		580360	580421	—	—	—	CVI--X-2-10

Table 13. Seal Kits

NOTE						
Replacement seal kits include F3 seals only. Kits include all necessary seals for cartridge insert and cartridge cover assembly on any type of cartridge valve. If a pilot valve is mounted on the cover assembly, refer to Table 3 and obtain the pilot valve seal kit (includes interface seals) from the pilot valve parts drawing.						
Valve Size (mm)	Seal Kit	920173	920175	920365	920177	920208
16	25	32	40	50	63	920210

Table 12. Insert Springs

Note: 14.5 psi = 1 bar

Area Ratio	Cracking Pressure (psi)	Valve Size/ Insert Spring									
		16mm	25mm	32mm	40mm	50mm	63mm				
1:1	3.8 - 4.3	761564	761567	—	761570	—	—	763676	—	—	—
	21.7	761565	761568	—	761571	—	—	—	—	—	—
	29.0 - 33.4	761566	761569	—	761572	—	—	—	—	—	—
	36.3	—	—	—	—	—	—	—	—	—	—
1:1.1	40.6	—	—	—	815222	—	—	—	—	—	—
	4.3	761564	761567	815220	761570	763674	763712	—	—	—	—
	20.3	—	—	—	815221	—	—	—	—	—	—
	24.7	761565	761568	—	761571	763675	763713	—	—	—	—
1:2	36.3	761566	761569	—	761572	763676	763714	—	—	—	—
	39.2	—	—	—	815222	—	—	—	—	—	—
	7.3	761564	761567	815220	761570	763674	763712	—	—	—	—
	36.3	761565	761568	815221	761571	763675	763713	—	—	—	—
1:2	72.5	761566	761569	815222	761572	763676	763714	—	—	—	—
	36.3	761565	761568	815221	761571	763675	763713	—	—	—	—
	7.3	761564	761567	815220	761570	763674	763712	—	—	—	—
	39.2	—	—	—	815222	—	—	—	—	—	—

Function	Area Ratio
D10	1:1
D11	1:1.1
D20	1:2
F	1:2
R	1:2

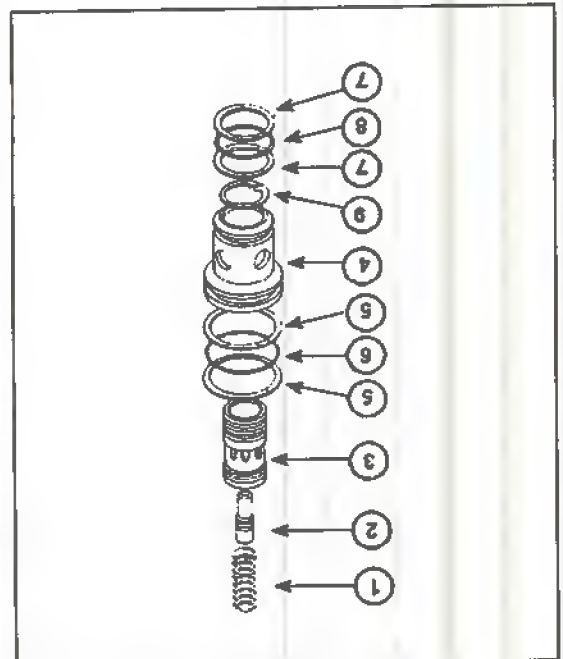
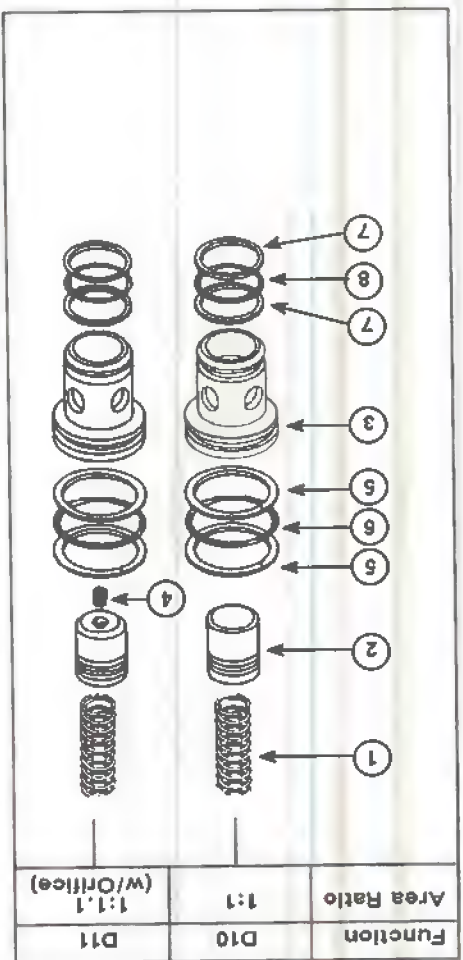


Figure 32. Cartridge Insert Parts for Pressure Relief & Unloading

Item No.	Part Name	Valve Size (mm)			
		16	25	32	40
1	Spring	16	25	32	40
2	Check Valve S/A	764134	764134	764134	764134
3	Spool	764164	764164	764164	764164
4	Sleeve	580366	580366	580366	580366
5	Back-up Ring	277652	277652	277652	277652
6	O-Ring	262360	262360	262360	262360
7	Back-up Ring	277648	277648	277648	277648
8	O-Ring	262356	262356	262356	262356
9	Retaining Ring	92757	92757	92757	92757

- ▲ - Included in seal kit (Table 13)
- - Individual insert parts not available for sale. Obtain insert kit noted in Table 11.
- ⊖ - Do not remove. Check valve S/A is bonded into spool with special compound.

Item No.	Part Name	Valve Size (mm)			
		16	25	32	40
1	Spring	764166	764166	764166	764166
2	Check Valve S/A	764134	764134	764134	764134
3	Spool	764164	764164	764164	764164
4	Sleeve	580366	580366	580366	580366
5	Back-up Ring	277652	277652	277652	277652
6	O-Ring	262360	262360	262360	262360
7	Back-up Ring	277648	277648	277648	277648
8	O-Ring	262356	262356	262356	262356
9	Retaining Ring	92757	92757	92757	92757

Item No.	Part Name	Valve Size (mm)			
		16	25	32	40
1	Spring	16-40	16-40	16-40	16-40
2	Poppet	994806	994807	994808	994809
3	Sleeve	994806	994807	994808	994809
4	Orifice (Std.)	986032	986037	986037	815407

See Table 12

Function

D10 D11

16-40

994806 994807 994808 994809

986032 986037 986037 815407

16 25 32 40

16-40

APPENDIX

The following diagrams (Figures 34, 35 and 36) illustrate various cartridge valve arrangements and related bolt kits for cartridge valves with pilot valve interface covers.

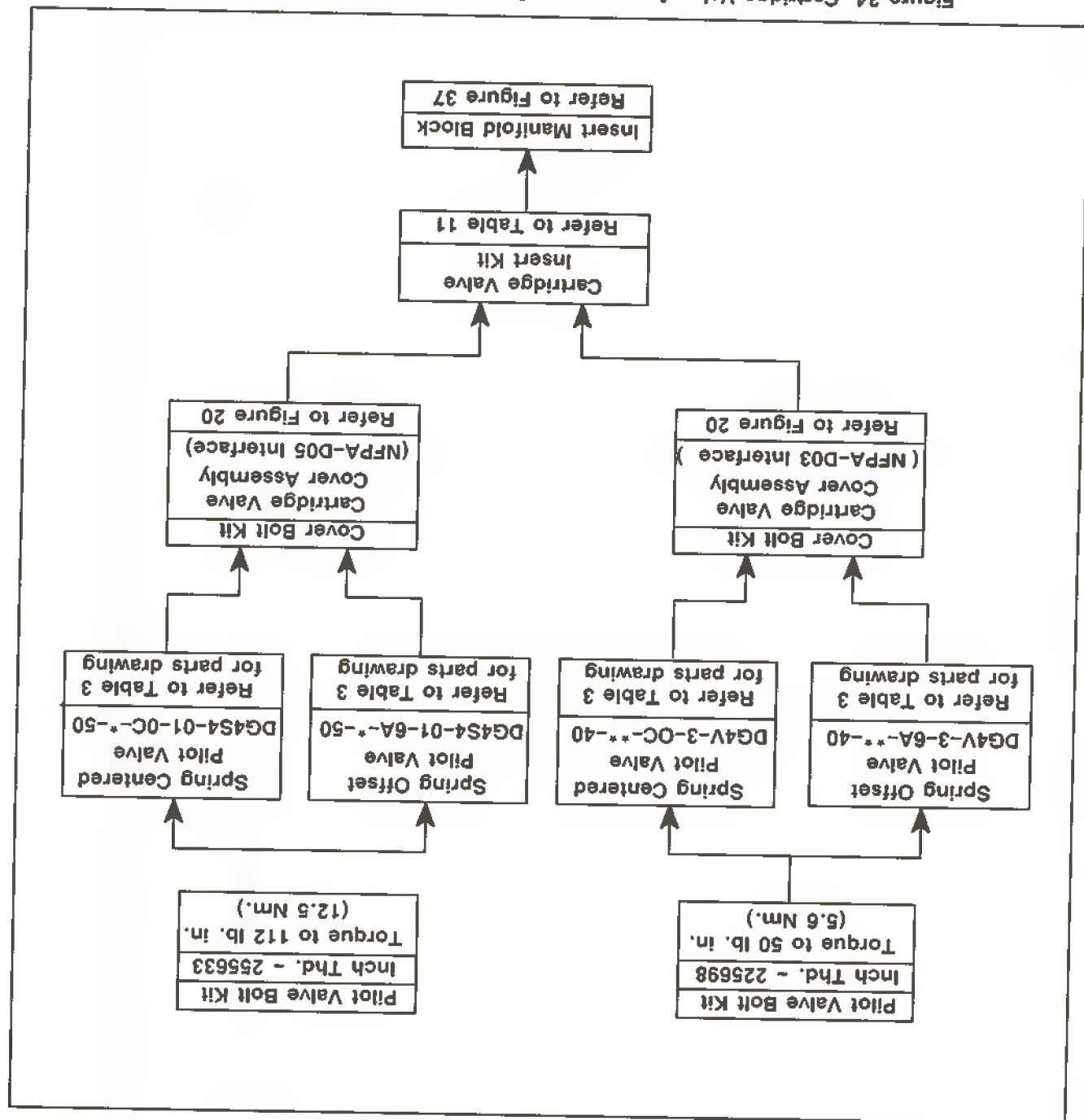


Figure 34. Cartridge Valve Arrangement for Directional Cover (NFPA-D03/D05)

Figure 35. Cartridge Valve Arrangement for Pressure Relief Cover (NPPA-D03)

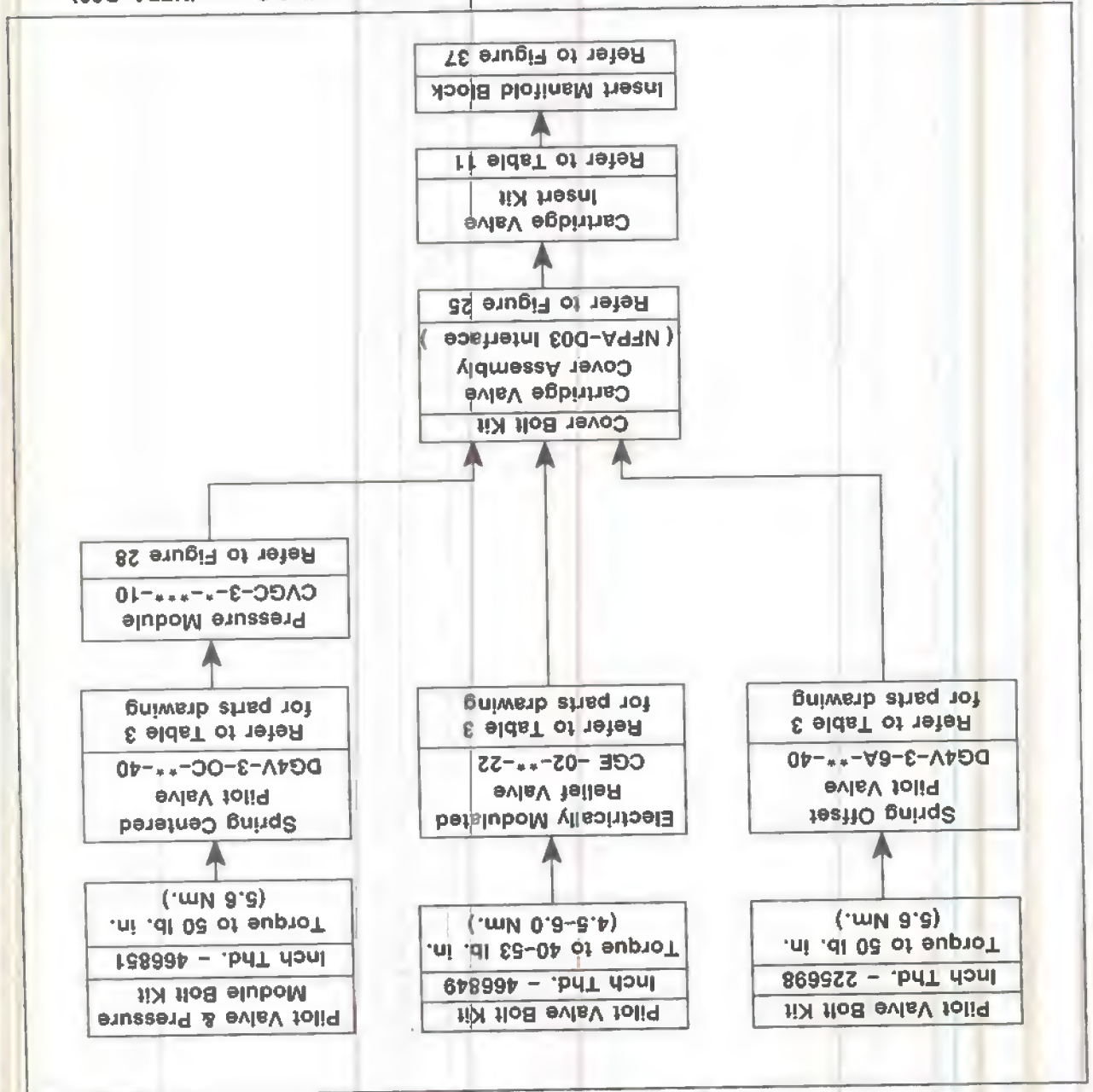
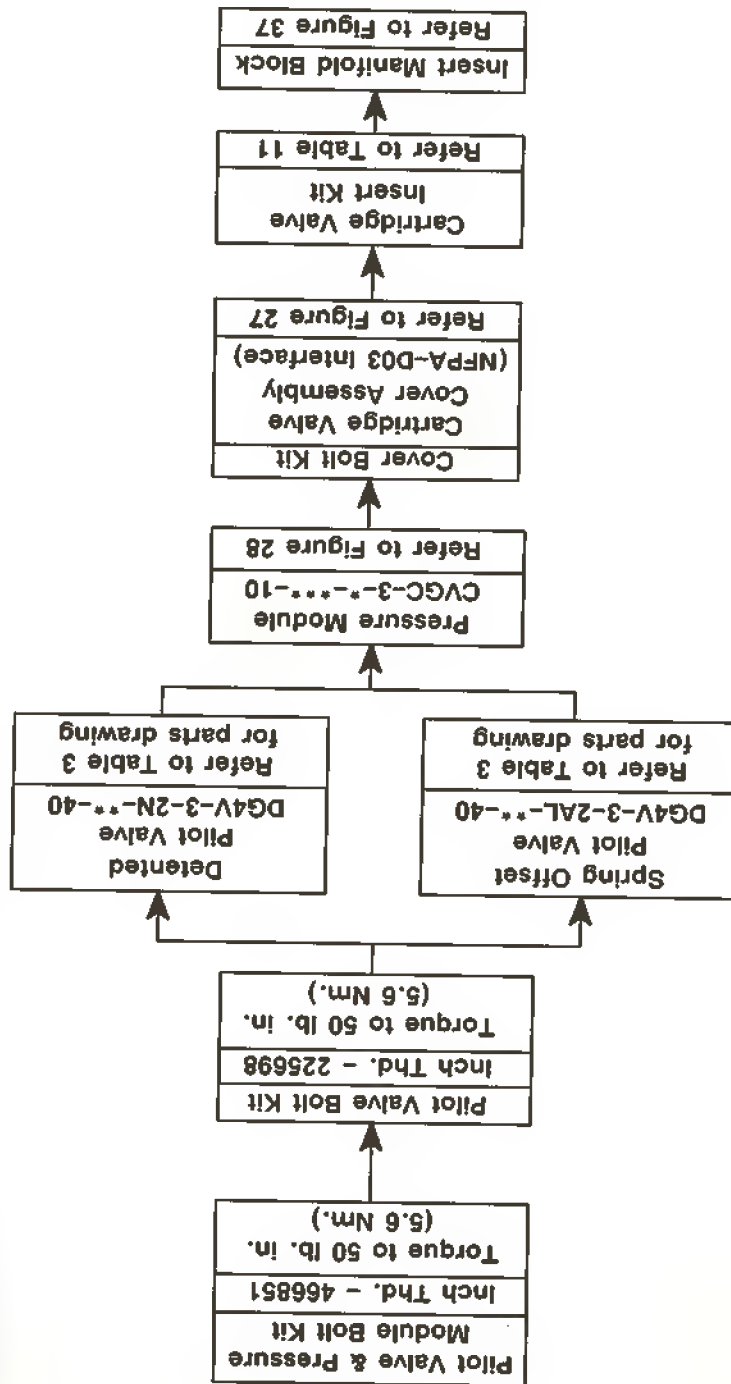


Figure 36. Cartridge Valve Arrangement for Pressure Reducing Cover (NFA-D03)

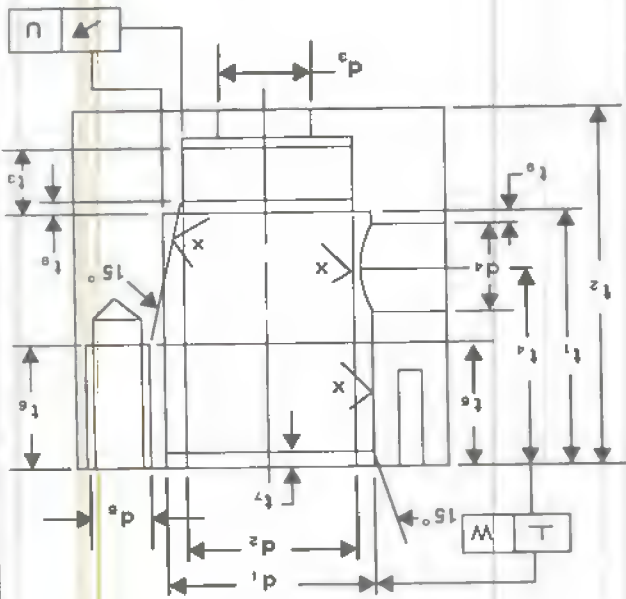
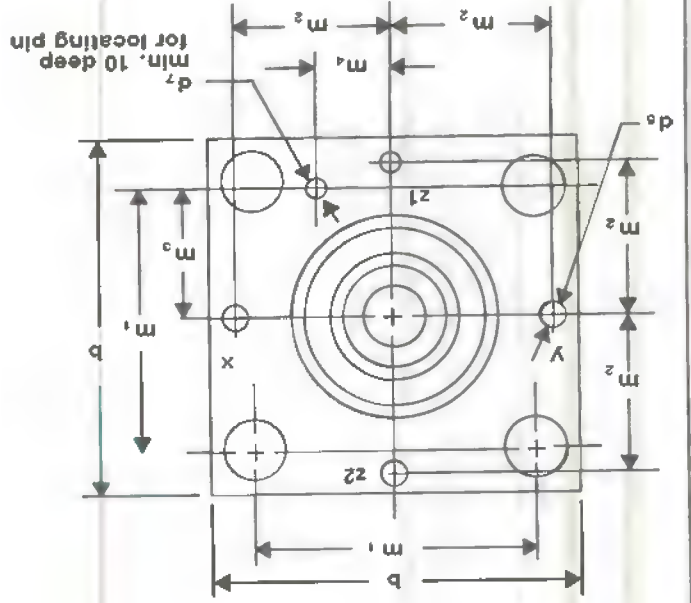


Manifold Block - Recess Dimensions to DIN 24342

Dimension Nominal Size - Metric (inches)

Dimension	16mm	25mm	32mm	40mm	50mm	63mm
b	65(2.56)	86(3.35)	102(4.01)	125(4.92)	140(5.51)	180(7.09)
d ₁ min.	32.000(1.2598)	45.000(1.7717)	60.000(2.3622)	75.000(2.9528)	90.000(3.5433)	102.000(4.0141)
d ₁ max.	32.025(1.2608)	45.025(1.7726)	60.030(2.3633)	75.030(2.9539)	90.035(3.5447)	120.035(4.7258)
d ₂ min.	25.000(0.9843)	34.000(1.3386)	45.000(1.7716)	55.000(2.1653)	68.000(2.6772)	90.000(3.5433)
d ₂ max.	25.021(0.9851)	34.025(1.3396)	45.030(1.7727)	55.030(2.1665)	68.030(2.6783)	90.035(3.5447)
d ₃ max.	16(.63)	25(.98)	32(1.26)	40(1.57)	50(1.97)	63(2.48)
d ₃ min.	16(.63)	25(.98)	32(1.26)	40(1.57)	50(1.97)	63(2.48)
d ₄ max.	25(.98)	32(1.26)	40(1.57)	50(1.97)	63(2.48)	80(3.15)
d ₄ min.	25(.98)	32(1.26)	40(1.57)	50(1.97)	63(2.48)	80(3.15)
d ₅ max.	4(.157)	6(.236)	8(.314)	10(.393)	10(.393)	12(.472)
d ₅ min.	4(.157)	6(.236)	8(.314)	10(.393)	10(.393)	12(.472)
d ₆ max.	4(.157)	6(.236)	8(.314)	10(.393)	10(.393)	12(.472)
d ₆ min.	4(.157)	6(.236)	8(.314)	10(.393)	10(.393)	12(.472)
d ₇ + 0.2(+.008)	4.000(.1575)	6.000(.2362)	8.000(.3149)	10.000(.3936)	10.000(.3936)	12.000(.4724)
d ₇ + 0.2(+.008)	4.180(.1646)	6.180(.2433)	8.180(.3220)	10.180(.4007)	10.180(.4007)	12.180(.4815)
m ₁ + 0.2(+.008)	46(1.811)	58(2.284)	70(2.755)	85(3.347)	100(3.937)	125(4.921)
m ₂ + 0.2(+.008)	25(.984)	33(1.299)	41(1.614)	50(1.969)	58(2.284)	75(2.953)
m ₃ + 0.2(+.008)	23(.906)	29(1.142)	35(1.377)	42.5(1.674)	50(1.969)	62.5(2.461)
m ₄ + 0.2(+.008)	10.5(.414)	16(.630)	17(.669)	23(.906)	30(1.181)	38(1.496)
t ₁ + 0.1(+.004)	43(1.692)	58(2.283)	70(2.755)	87(3.425)	100(3.937)	130(5.118)
t ₂ + 0.1(+.004)	56(2.204)	72(2.834)	85(3.346)	105(4.133)	122(4.803)	155(6.103)
t ₃	11(.433)	12(.472)	13(.511)	15(.590)	17(.669)	20(.787)
t ₄	34(1.338)	44(1.732)	52(2.047)	64(2.519)	72(2.834)	95(3.740)
t ₅ to d ₄ max.	29.5(1.161)	40.5(1.594)	48(1.889)	59(2.322)	65.5(2.578)	86.5(3.405)
t ₆	20(.787)	30(1.181)	30(1.181)	30(1.181)	35(1.377)	40(1.574)
t ₇	20(.787)	25(.984)	35(1.377)	35(1.377)	40(1.574)	55(2.165)
t ₈ Thd. Depth	2(.078)	2.5(.098)	2.5(.098)	3(.118)	4(.157)	4(.157)
t ₉	2(.078)	2.5(.098)	2.5(.098)	3(.118)	4(.157)	4(.157)
t ₁₀	1.5(.059)	1.5(.059)	1.5(.059)	3(.118)	3(.118)	3(.118)
t ₁₁ max.	25(.98)	31(1.220)	42(1.653)	53(2.086)	53(2.086)	75(2.953)
U	0.03(.0012)	0.03(.0012)	0.03(.0012)	0.05(.0020)	0.05(.0020)	0.05(.0020)
VRa	0.05(.0020)	0.05(.0020)	0.05(.0020)	0.1(.0039)	0.1(.0039)	0.2(.0079)

* Depth of finish "XRa" in hole.



STANDARD ORIFICE LOCATIONS

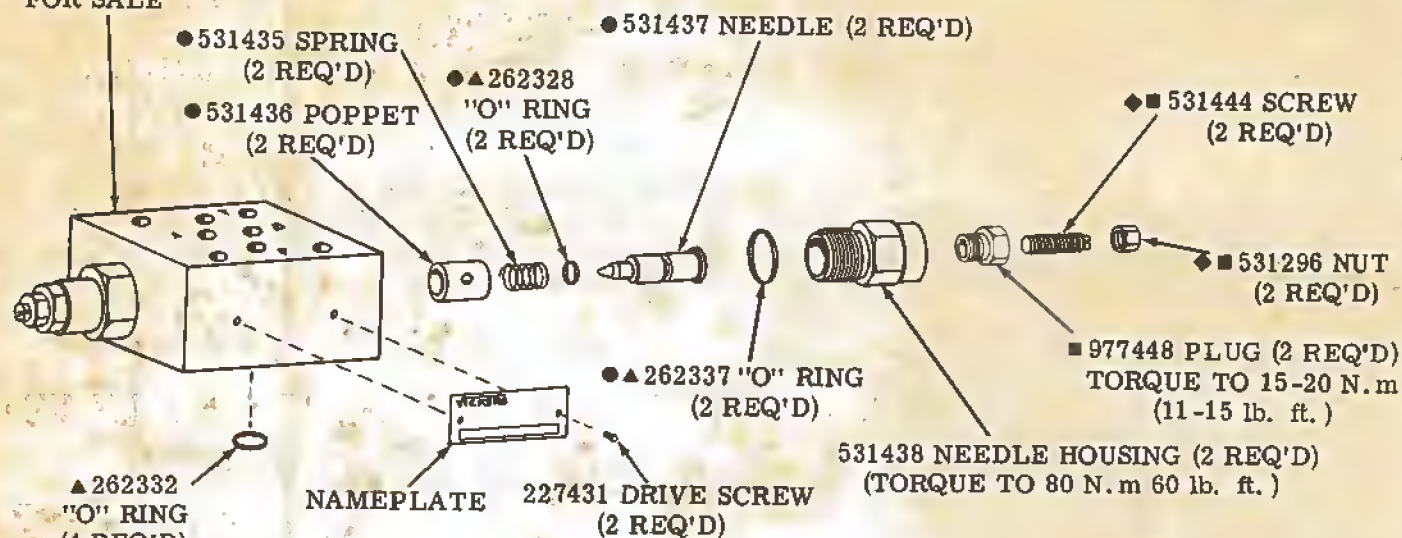
CVCS 16 ORIFICE LOCATION									
MODEL	"A"	"AP"	"B"	"X"	"Z1"	"Z2"	PLUG	XX	XX
CVCS-16-A-S2-10	XX	XX	XX	1.0	XX	XX	XX	XX	XX
CVCS-16-C-S2-10	XX	XX	XX	1.2	XX	XX	XX	XX	XX
CVCS-16-D1-S2-10	XX	XX	XX	1.2	XX	XX	XX	XX	XX
CVCS-16-N-S2-10	XX	XX	XX	1.0	XX	XX	XX	XX	XX
CVCS-16-PC-S2-10	XX	XX	XX	1.0	XX	XX	XX	XX	XX
CVCS-16-U-S2-10	XX	XX	XX	1.2	XX	XX	XX	XX	XX
CVCS-16-W-S2-10	XX	XX	XX	1.2	XX	XX	XX	XX	XX
CVCS-16-W11-S2-10	XX	XX	XX	1.0	XX	XX	XX	XX	XX
CVCS-16-W31-S2-10	XX	XX	XX	1.0	XX	XX	XX	XX	XX
CVCS-16-X-S2-10	XX	XX	XX	1.0	XX	XX	XX	XX	XX
CVCS-16-X1-S2-10	XX	XX	XX	1.0	XX	XX	XX	XX	XX
CVCS 25 ORIFICE LOCATION									
MODEL	"A"	"AP"	"B"	"X"	"Z1"	"Z2"	PLUG	XX	XX
CVCS-25-AD1-S2-10-NC	1.2	PLUG	XX	XX	XX	XX	XX	XX	XX
CVCS-25-A-S2-10	XX	XX	XX	1.2	XX	XX	XX	XX	XX
CVCS-25-C-S2-10	XX	XX	XX	1.2	XX	XX	XX	XX	XX
CVCS-25-C1-S2-10	XX	XX	XX	1.2	XX	XX	XX	XX	XX
CVCS-25-D1-S2-10	XX	XX	XX	1.2	XX	XX	XX	XX	XX
CVCS-25-N-S2-10	XX	XX	XX	1.2	XX	XX	XX	XX	XX
CVCS-25-PC-S2-10	XX	XX	XX	1.2	XX	XX	XX	XX	XX
CVCS-25-U-S2-10	XX	XX	XX	1.2	XX	XX	XX	XX	XX
CVCS-25-W-S2-10	XX	XX	XX	1.2	XX	XX	XX	XX	XX
CVCS-25-W11-S2-10	XX	XX	XX	1.2	XX	XX	XX	XX	XX
CVCS-25-W31-S2-10	1.2	XX	XX	1.2	XX	XX	XX	XX	XX
CVCS-25-X-S2-10	XX	XX	XX	1.2	XX	XX	XX	XX	XX
CVCS-25-X1-S2-10	XX	XX	XX	1.2	XX	XX	XX	XX	XX
CVCS 32 ORIFICE LOCATION									
MODEL	"A"	"AP"	"B"	"X"	"Z1"	"Z2"	PLUG	XX	XX
CVCS-32-A-S2-10	XX	XX	XX	1.3	XX	XX	XX	XX	XX
CVCS-32-C-S2-10	XX	XX	XX	1.4	XX	XX	XX	XX	XX
CVCS-32-C1-S2-10	XX	XX	XX	1.4	XX	XX	XX	XX	XX
CVCS-32-D1-S2-10	XX	XX	XX	1.3	XX	XX	XX	XX	XX
CVCS-32-N-S2-10	XX	XX	XX	1.3	XX	XX	XX	XX	XX
CVCS-32-PC-S2-10	XX	XX	XX	1.3	XX	XX	XX	XX	XX
CVCS-32-U-S2-10	XX	XX	XX	1.3	XX	XX	XX	XX	XX
CVCS-32-W-S2-10	XX	XX	XX	1.3	XX	XX	XX	XX	XX
CVCS-32-W11-S2-10	1.3	XX	XX	1.3	XX	XX	XX	XX	XX
CVCS-32-W31-S2-10	1.3	XX	XX	1.3	XX	XX	XX	XX	XX
CVCS 40 ORIFICE LOCATION									
MODEL	"A"	"AP"	"B"	"X"	"Z1"	"Z2"	PLUG	XX	XX
CVCS-40-AD1-S2-W-10-NC	1.4	PLUG	XX	XX	XX	XX	XX	XX	XX
CVCS-40-A-S2-W-10	XX	XX	XX	1.4	XX	XX	XX	XX	XX
CVCS-40-C-S2-10	XX	XX	XX	1.5	XX	XX	XX	XX	XX
CVCS-40-C1-S2-10	XX	XX	XX	1.5	XX	XX	XX	XX	XX
CVCS-40-D1-S2-10	XX	XX	XX	1.5	XX	XX	XX	XX	XX
CVCS-40-N-S2-10	XX	XX	XX	1.4	XX	XX	XX	XX	XX
CVCS-40-PC-S2-10	XX	XX	XX	1.4	XX	XX	XX	XX	XX
CVCS-40-U-S2-10	XX	XX	XX	1.4	XX	XX	XX	XX	XX
CVCS-40-W-S2-10	XX	XX	XX	1.4	XX	XX	XX	XX	XX
CVCS-40-W11-S2-10	1.4	XX	XX	1.4	XX	XX	XX	XX	XX
CVCS-40-W31-S2-10	1.4	XX	XX	1.4	XX	XX	XX	XX	XX
CVCS 50 ORIFICE LOCATION									
MODEL	"A"	"AP"	"B"	"X"	"Z1"	"Z2"	PLUG	XX	XX
CVCS-50-A-S2-W-10	XX	XX	XX	1.6	XX	XX	XX	XX	XX
CVCS-50-D2-S2-10	XX	XX	XX	1.6	XX	XX	XX	XX	XX
CVCS-50-N-S2-10	XX	XX	XX	1.6	XX	XX	XX	XX	XX
CVCS 63 ORIFICE LOCATION									
MODEL	"A"	"AP"	"B"	"X"	"Z1"	"Z2"	PLUG	XX	XX
CVCS-63-A-S2-W-10	XX	XX	XX	1.8	XX	XX	XX	XX	XX
CVCS-63-D2-S2-10	XX	XX	XX	1.8	XX	XX	XX	XX	XX
CVCS-63-N-S2-10	XX	XX	XX	1.8	XX	XX	XX	XX	XX

Example: XX = Orifice location not available
- = Optional orifice location
1.2 = Standard orifice (mm) location
PLUG = Solid Plug

MODEL	BODY
X	531434
Y	531433

NOT AVAILABLE
FOR SALE

REPLACEMENT PARTS FOR THIS UNIT ARE AVAILABLE
IN SERVICE KITS. PARTS PREFIXED BY AN ♦ CAN BE
OBTAINED INDIVIDUALLY. BODIES ARE NOT AVAILABLE
FOR SALE.

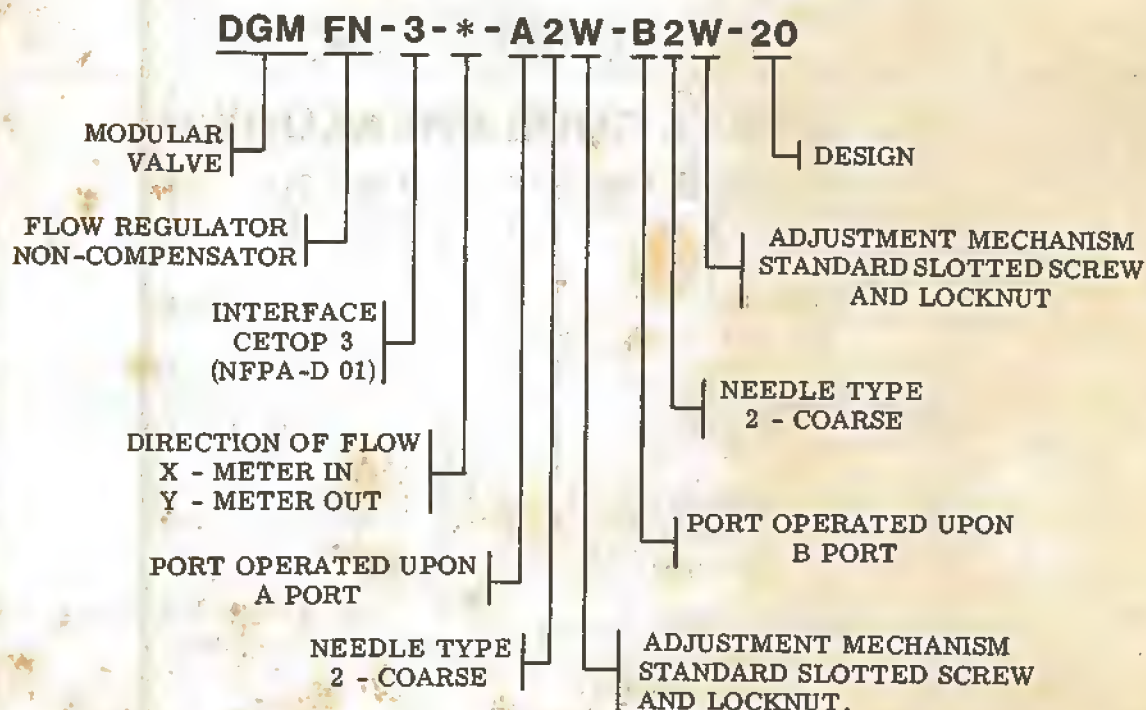


● INCLUDED IN 942447
NEEDLE VALVE KIT

▲ INCLUDED IN
920084 SEAL KIT

■ ONE EACH INCLUDED
IN ADJUSTMENT SCREW
KIT 942445

MODEL CODE BREAKDOWN



FLOW CONTROL MODULE

VICKERS.

A TRINOMA COMPANY

REPLACEMENT PARTS FOR THIS UNIT ARE AVAILABLE IN SERVICE KITS. PARTS PREFIXED BY AN ♦ CAN BE OBTAINED INDIVIDUALLY. BODIES ARE NOT AVAILABLE FOR SALE.

MODEL	BODY
X	531434
Y	531433

●531435 SPRING

●531436
POPPET

●▲262328
"O" RING

●531437 NEEDLE

◆ ■ 531444 SCREW

531296 NUT

■ 977448 PLUG
TORQUE TO 15-20 N.m)
(11-15 lb. ft.)

531438 NEEDLE HOUSING (2 REQ'D)
(TORQUE TO 80 N.m (60 lbf. ft.)

531497 PLUG
TORQUE TO
80 N.m 60 lbf. ft.
(NOT AVAILABLE
FOR SALE)

▲ 262337
"O" RING

▲262332
"O" RING
(4 REQ'D)

NAMEPLATE

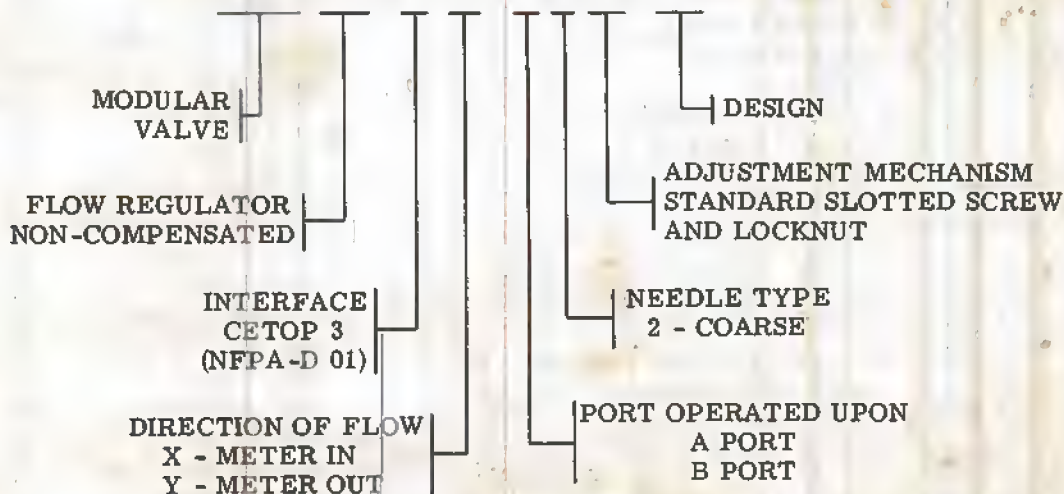
227431 DRIVE SCREW
(2 REQ'D)

▲INCLUDED IN
SEAL KIT 920084

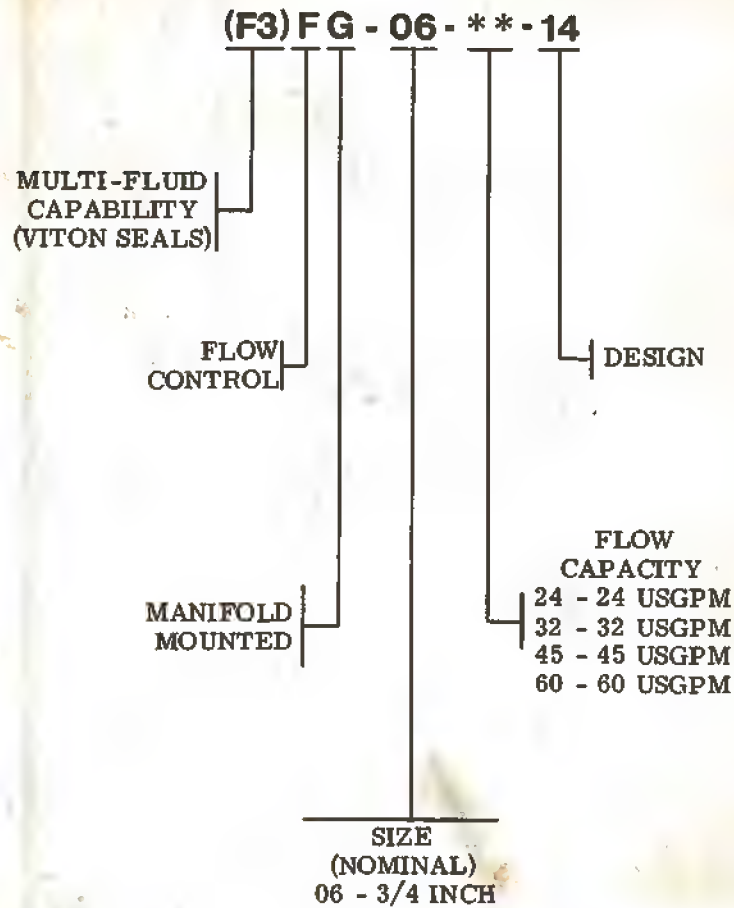
■ INCLUDED IN
ADJUSTMENT
SCREW KIT
942445

NOTE: FOR MODEL DGMFN-3-* -A*W-20 REVERSE
PLUG 531497 AND FLOW CONTROL PARTS

DGM FN 3- * - * 2 W - 20



MODEL CODE BREAKDOWN



For satisfactory service life of these components, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from Vickers OFP, OFR, and OFRS series are recommended.

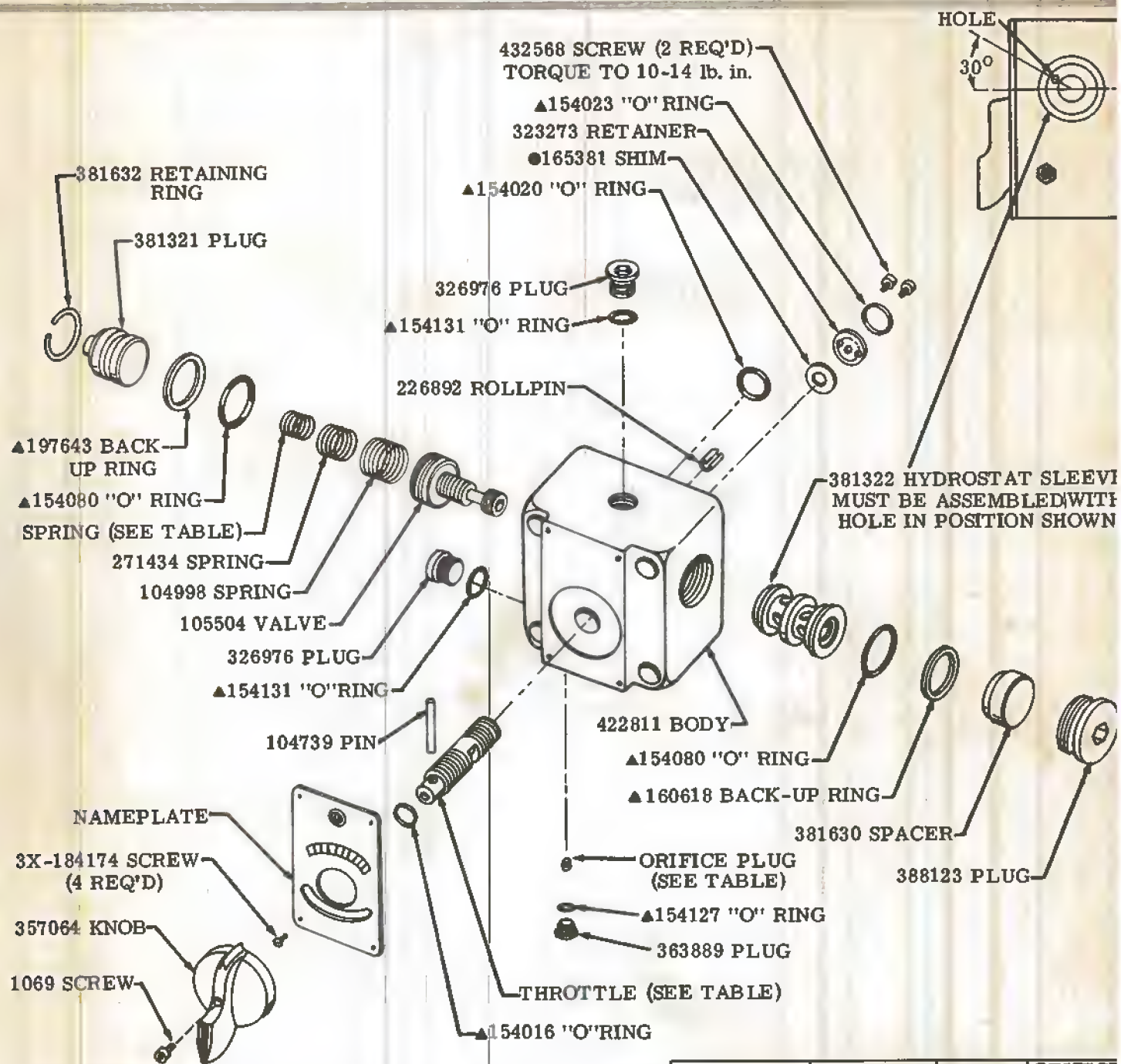
Litho in U. S. A.

Service Parts Information

VICKERS
A TRINITY COMPANY

FLOW CONTROL VALVES

FG-06-**-14



▲ INCLUDED IN
920212 SEAL KIT

F3 EQUIVALENT
SEAL KIT 920217

● NOTE
ADD SHIMS AS REQUIRED
TO PREVENT THROTTLE
FROM LOCKING.

MODEL	THROTTLE	SPRING	ORIFICE PLUG
FG-06-24-14	133181	—	162976
FG-06-32-14	133182		
FG-06-45-14	133183		
FG-06-60-14	426851	387113	16794

Vickers, Incorporated
P.O. Box 802
Troy, Michigan 48007-0302

Revised 11-1-85

I-3404-S

MODEL CODE BREAKDOWN

(F*) F (C) G -02- *** (*) · (T) -50-S32

F3 - SPECIAL SEALS
F6 - WATER -IN-OIL
EMULSIONS

FLOW CONTROL

CHECK VALVE

SUBPLATE OR
MANIFOLD MOUNTED

NOMINAL SIZE
(1/4 INCH)

SPECIAL
LOCK
FEATURE

DESIGN

"T" TRIM ADJUSTMENT OPTION
(OMIT FOR STANDARD MODELS)

FLOW CONTROL
FLOW CAPACITY
300 CU. IN./MIN.
1500 CU. IN./MIN.

FLOW ADJUSTMENT PROCEDURE

WARNING

Before breaking a circuit connection, make certain that power is off and system pressure has been released. Lower all vertical cylinders, discharge accumulators, and block any load whose movement could generate pressure.

1. Remove the flow control from the machine or vehicle.
2. Separate the cover from the main body of the valve.
3. Attach the flow control to the machine without the cover. Use mounting bolt kit BKFG-02-640 to secure the valve during alignment.

(The bolt kit consists of: four (4), 5/16 - 18, 2" long socket head screws SAE grade 7 or better.)

4. Loosen set screw in flange of throttle shaft and rotate shaft clockwise to increase flow or counterclockwise to decrease flow. When flow is set, tighten the set screw.

WARNING

Before removing the valve from the machine, remove power as shown above.

5. Remove the valve from the machine.
6. Place cover over the main body and assemble the valve to the machine or vehicle with the four screws provided with the valve.

For satisfactory service life of these components, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from Vickers OFP, OFR, and OFRS series are recommended.

Litho in U.S.A.

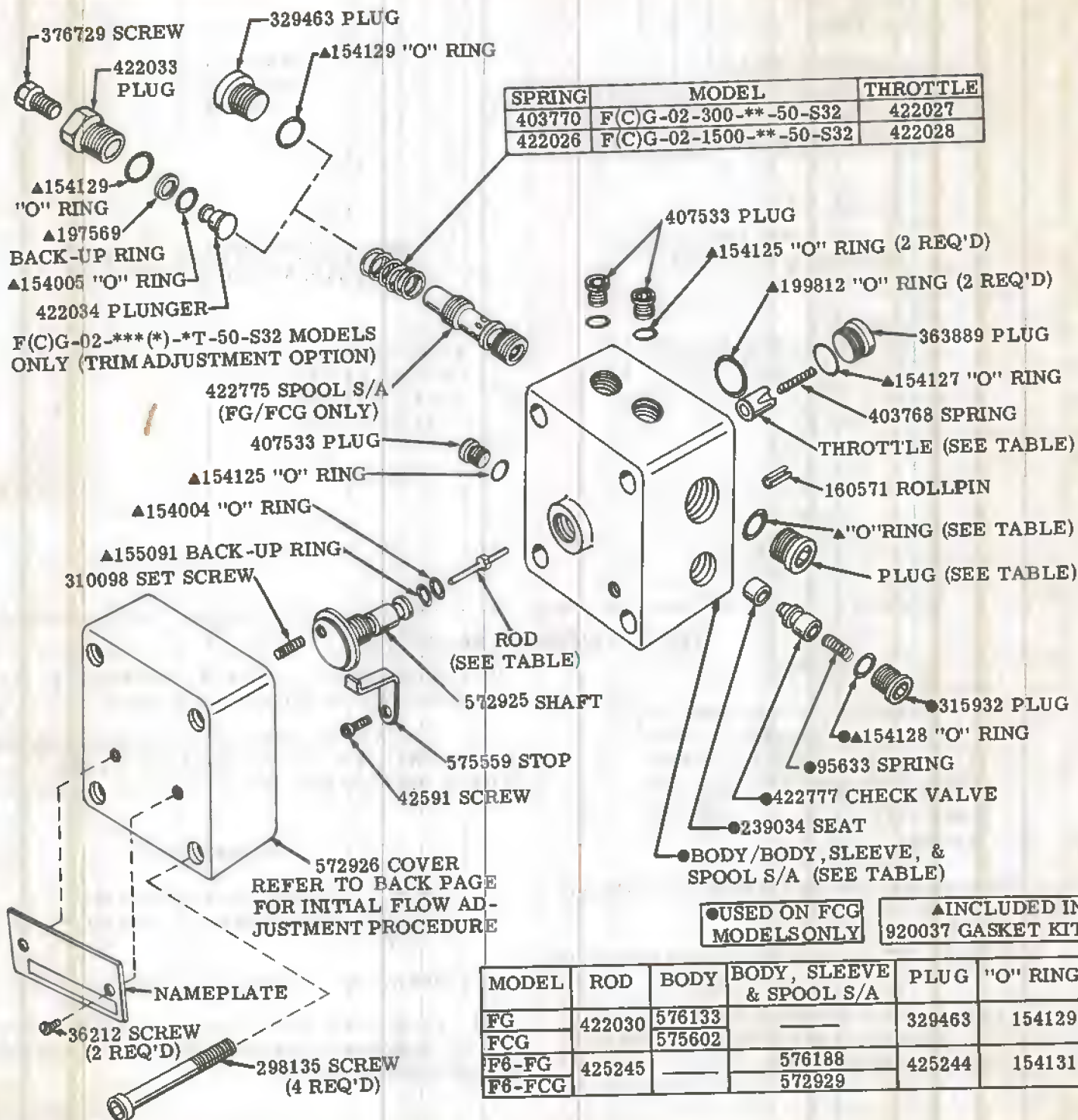
Service Parts Information

VICKERS

A TRIMONA COMPANY

FLOW CONTROL VALVES

(F6)-F(C)G-02-300-**-50-S32
(F6)-F(C)G-02-1500-**-50-S32



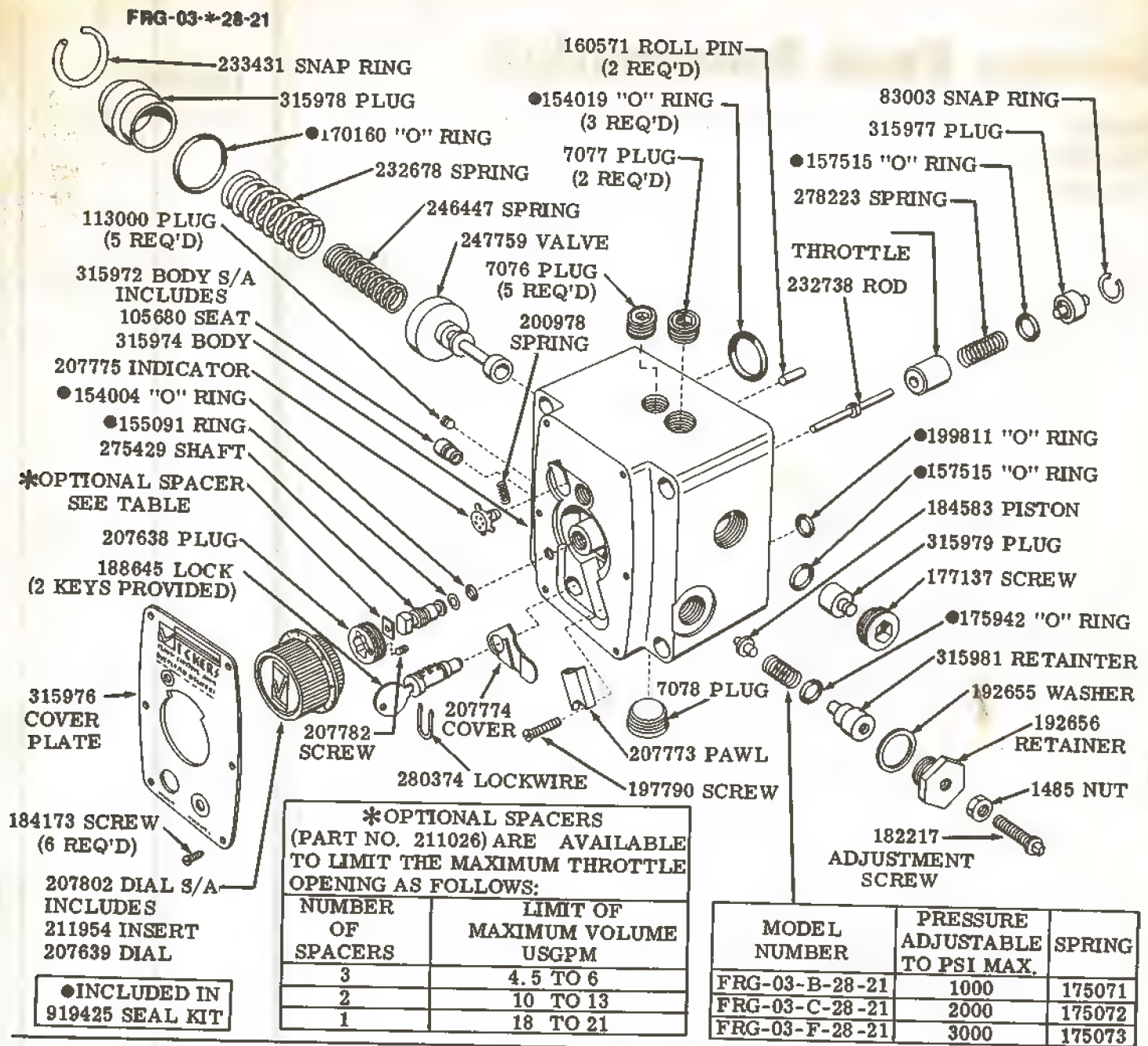
SPRING	MODEL	THROTTLE
403770	F(C)G-02-300-**-50-S32	422027
422026	F(C)G-02-1500-**-50-S32	422028

MODEL	ROD	BODY	BODY, SLEEVE & SPOOL S/A	PLUG	"O" RING
FG	422030	576133	—	329463	154129
FCG		575602	—		
F6-FG	425245	—	576188	425244	154131
F6-FCG		—	572929		

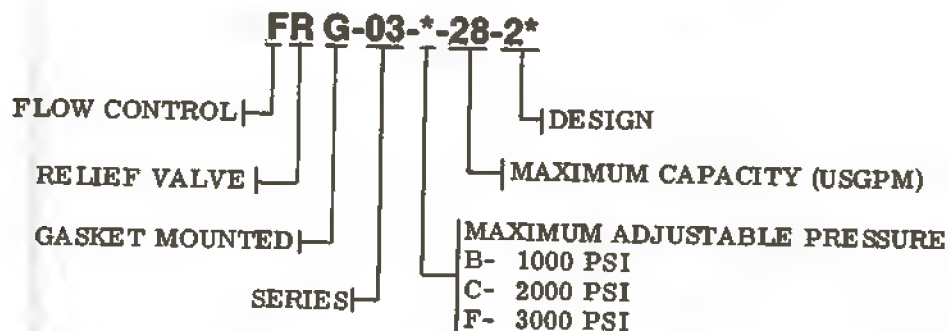
Vickers, Incorporated
P.O. Box 302
Troy, Michigan 48007-0302

Revised 11-1-87

I-3407-S



MODEL CODE BREAKDOWN



For satisfactory service life of these components, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from Vickers OFP, OFR, and OFRS series are recommended.

Litho in U. S. A.

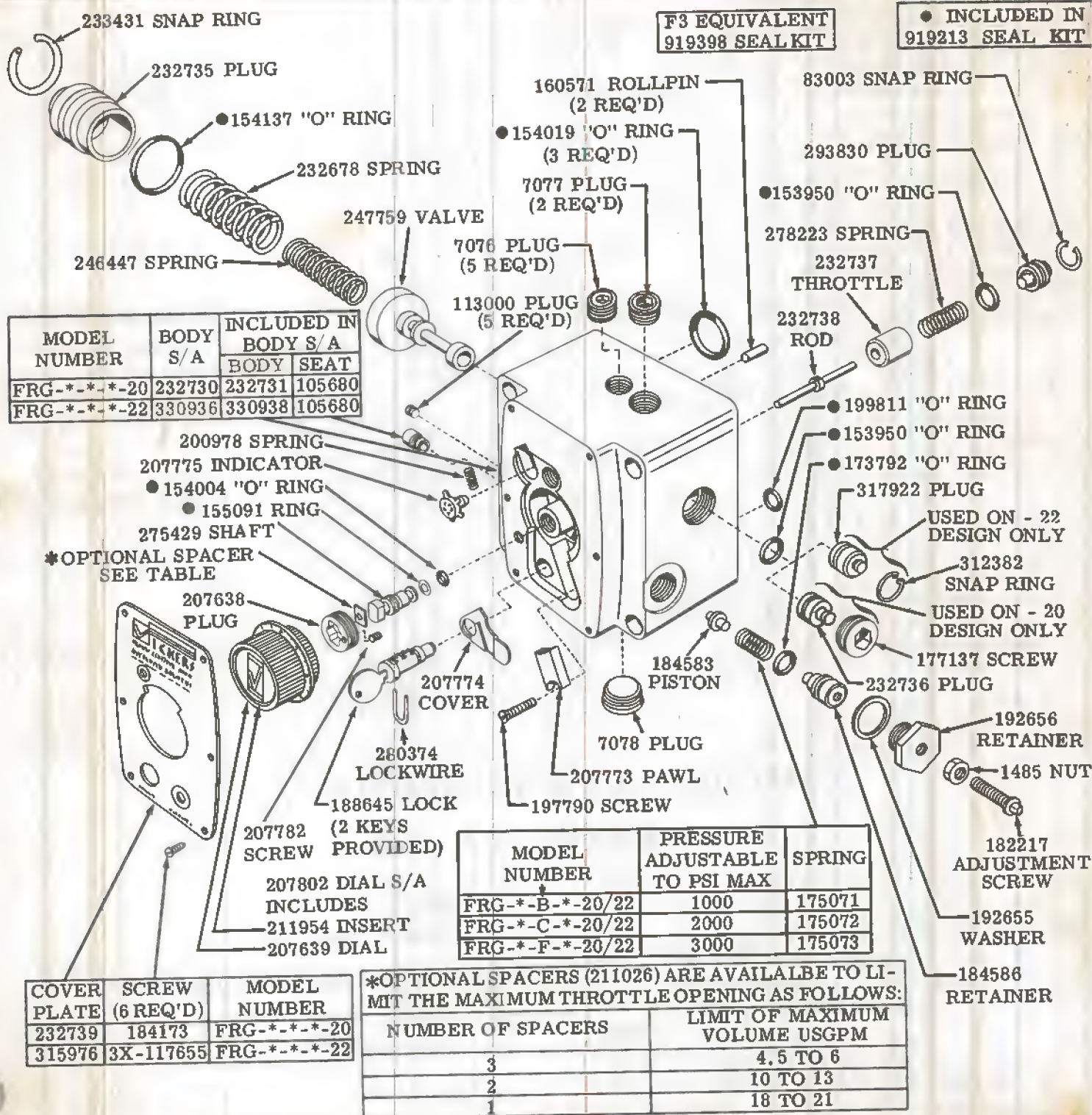
Service Parts Information

FLOW
CONTROL
VALVES

FRG-03-*-28-2*

VICKERS

A TRIMONA COMPANY



Vickers, Incorporated
P.O. Box 302
Troy, Michigan 48007-0302

Revised 11-1-85

I-3410-S

233431 RETAINING RING

315978 PLUG

170160 "O" RING

232678 SPRING

246447 SPRING

232734 VALVE

7077 PLUG (3 REQ'D)

200978 SPRING

207775 INDICATOR

▲154004 "O" RING

▲155091 RING

275429 SHAFT

*OPTIONAL SPACER
SEE TABLE

207782 SCREW

207638 PLUG

315975 OVER PLATE

184173 SCREW
(6 REQ'D)

207802 DIAL
SUB-ASSY.
INCLUDES:
207639 DIAL
211954 INSERT

280374 LOCKWIRE

188645 LOCK
(2 KEYS PROVIDED)

207774 COVER

207773 PAWL

197790 SCREW

7076 PLUG (4 REQ'D)

▲154019 "O" RING (2 REQ'D)

160571 ROLL PIN (2 REQ'D)

83003 RETAINING RING

315977 PLUG

▲157515 "O" RING

278223 SPRING

232737 THROTTLE

232738 ROD

315973 BODY

▲157515 "O" RING

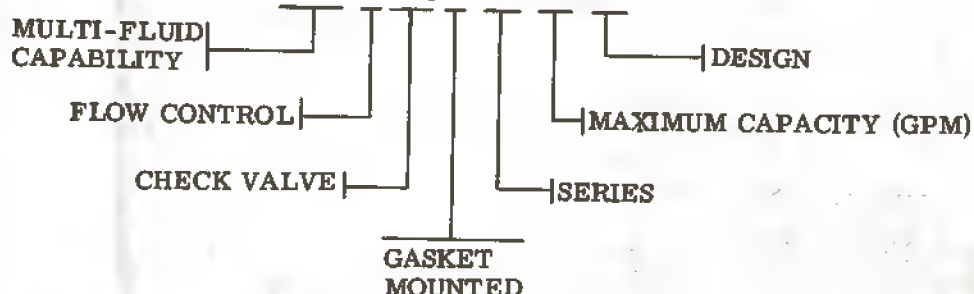
315979 PLUG

177137 SCREW

▲INCLUDED IN
919425 SEAL KIT

*OPTIONAL SPACERS (PART NO. 211026) ARE AVAILABLE TO LIMIT THE MAXIMUM THROTTLE OPENING AS FOLLOWS:	
NUMBER OF SPACERS	LIMIT OF MAXIMUM VOLUME GPM
3	4.5 TO 6
2	10 TO 13

(F3)-F(C)G-03-28-2*



Litho in U. S. A.

Service Parts Information

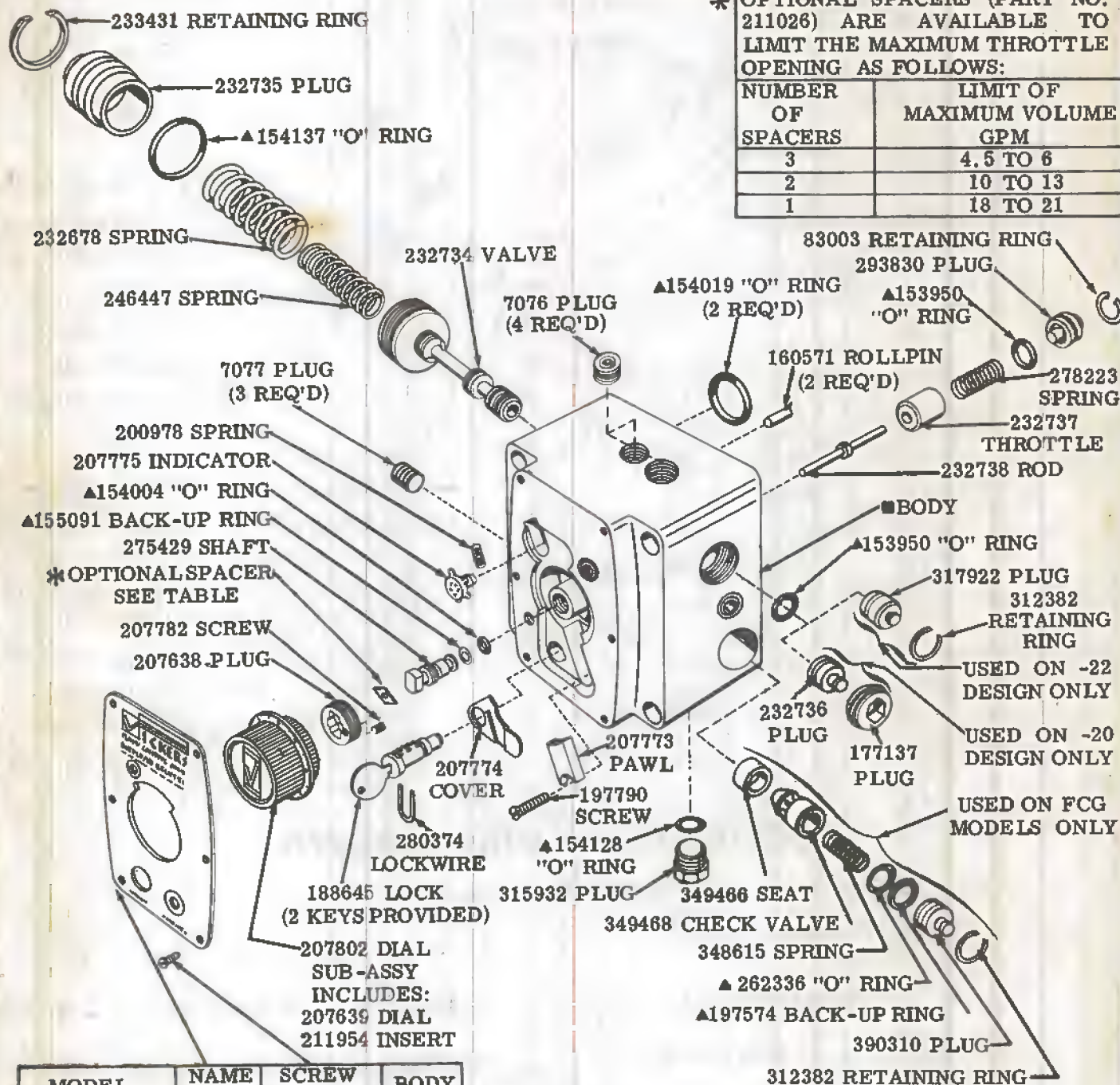
FLOW
CONTROL
VALVES

FG-03-28-21

F(C)G-03-28-20/22

VICKERS

A TRIMONA COMPANY



* OPTIONAL SPACERS (PART NO. 211026) ARE AVAILABLE TO LIMIT THE MAXIMUM THROTTLE OPENING AS FOLLOWS:

NUMBER OF SPACERS	LIMIT OF MAXIMUM VOLUME GPM
3	4.5 TO 6
2	10 TO 13
1	18 TO 21

MODEL	NAME PLATE	SCREW (6 REQ'D)	BODY
FG-03-28-20	232740	184173	232732
FG-03-28-22	315975	3X-117655	330937
FCG-03-28-22			390309

▲ INCLUDED IN
919213 SEAL KIT

F3 EQUIVALENT
919398 SEAL KIT

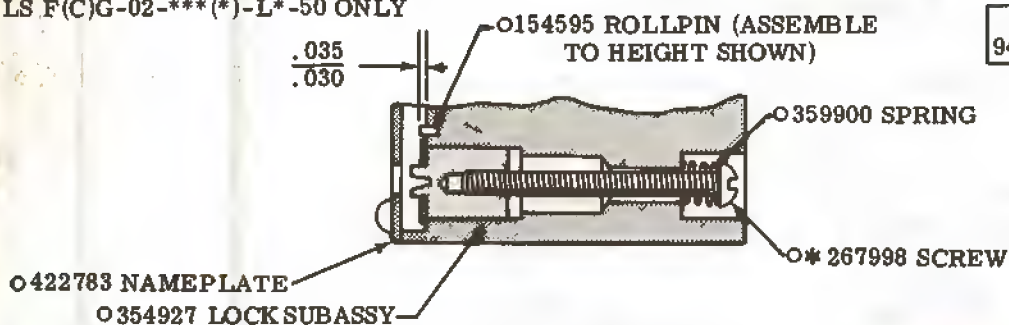
Vickers, Incorporated
P.O. Box 302
Troy, Michigan 48007-0302

Revised 11-1-85

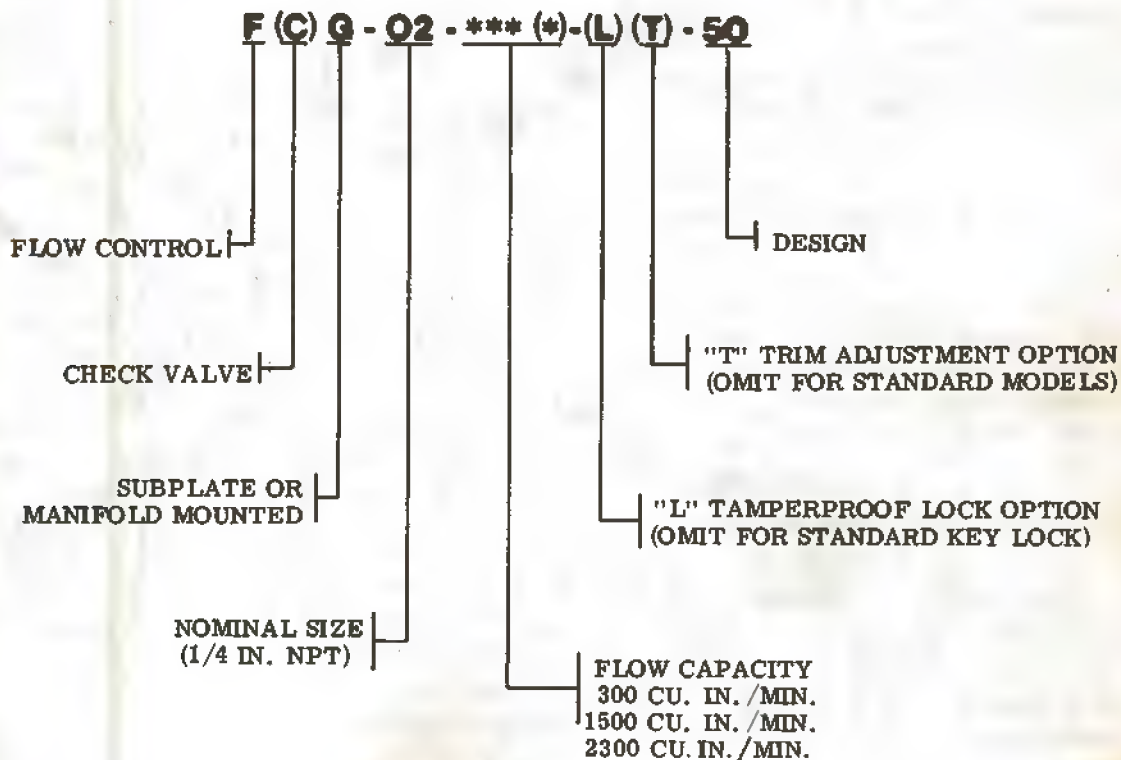
I-3411-S

TAMPERPROOF LOCK OPTION
MODELS F(C)G-02-*(*)-L*-50 ONLY**

**○ INCLUDED IN
 942085 LOCK KIT**



MODEL CODE BREAKDOWN



For satisfactory service life of these components, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from OFF, OFR and OFRS filter series are recommended.

Litho in U.S.A.

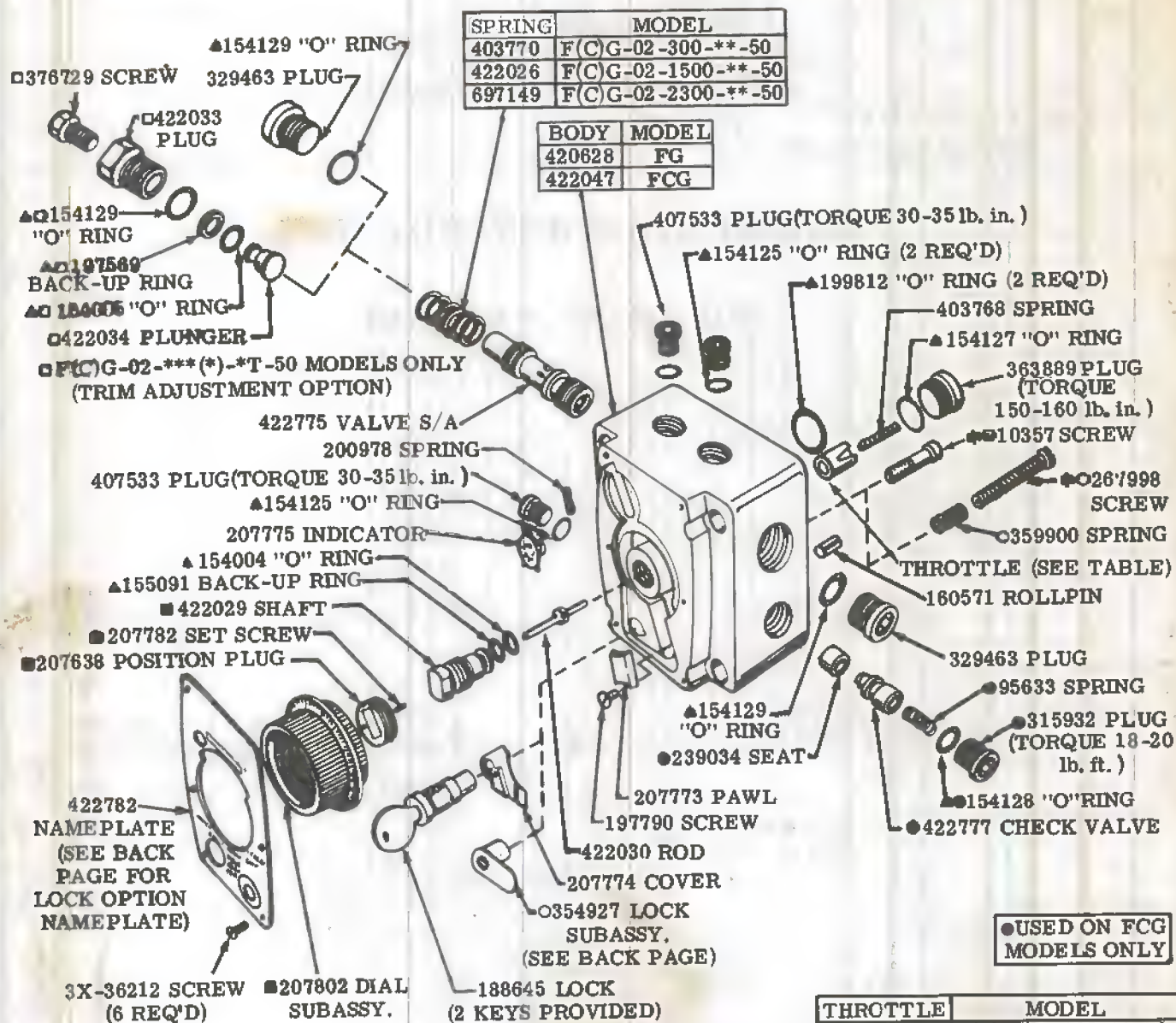
Service Parts Information

FLOW CONTROL VALVES

F(C)G-02-300-**-50
F(C)G-02-1500-**-50
F(C)G-02-2300-**-50

VICKERS

A TRISIVA COMPANY



SPRING	MODEL
403770	F(C)G-02-300-**-50
422026	F(C)G-02-1500-**-50
697149	F(C)G-02-2300-**-50

BODY	MODEL
420628	FG
422047	FCG

●USED ON FCG MODELS ONLY

■WITH 422029 CONTROL SHAFT SCREWED FULLY IN, ADJUST 207638 POSITIONING PLUG IN 207802 DIAL SO THAT "O" ON DIAL LINES UP WITH POINTER ON NAMEPLATE WHEN DIAL IS ASSEMBLED ON SHAFT. LOCK SECURELY WITH 207782 SET SCREW.

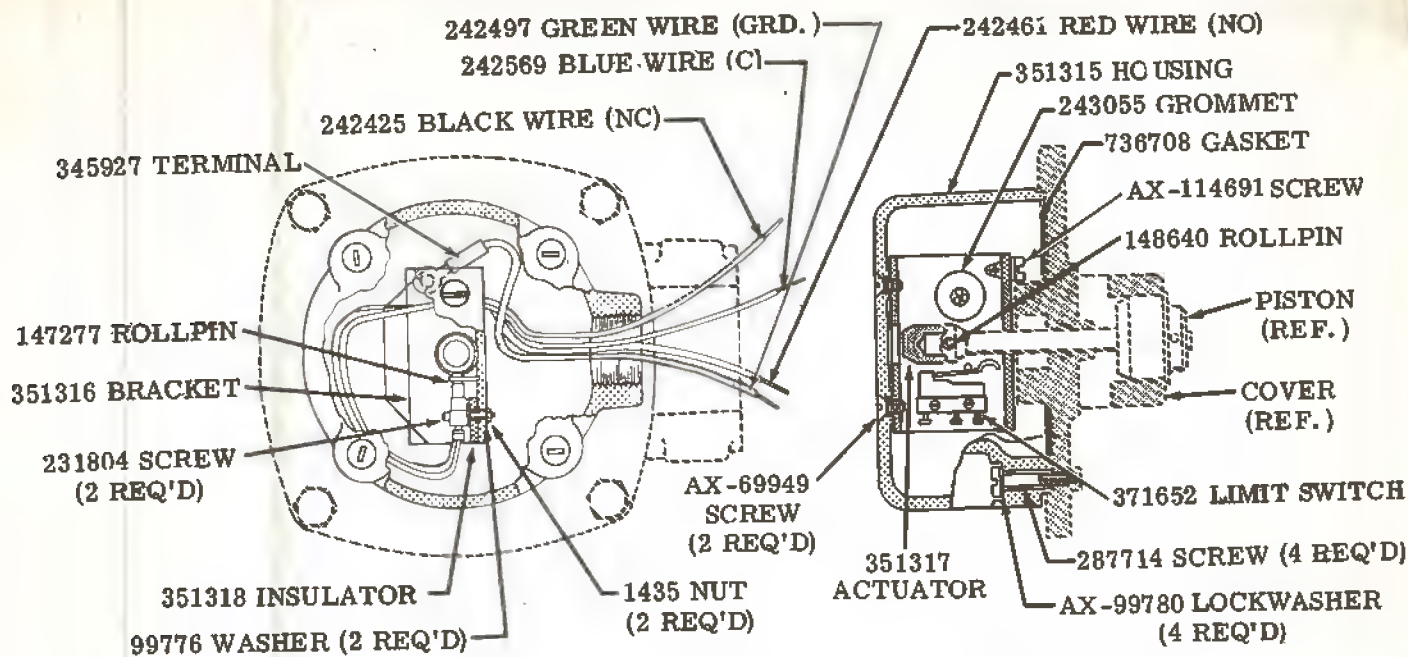
▲INCLUDED IN 920037 SEAL KIT

F3 EQUIVALENT SEAL KIT 920103

THROTTLE	MODEL
422027	F(C)G-02-300-**-50
422028	F(C)G-02-1500-**-50
853593	F(C)G-02-2300-**-50

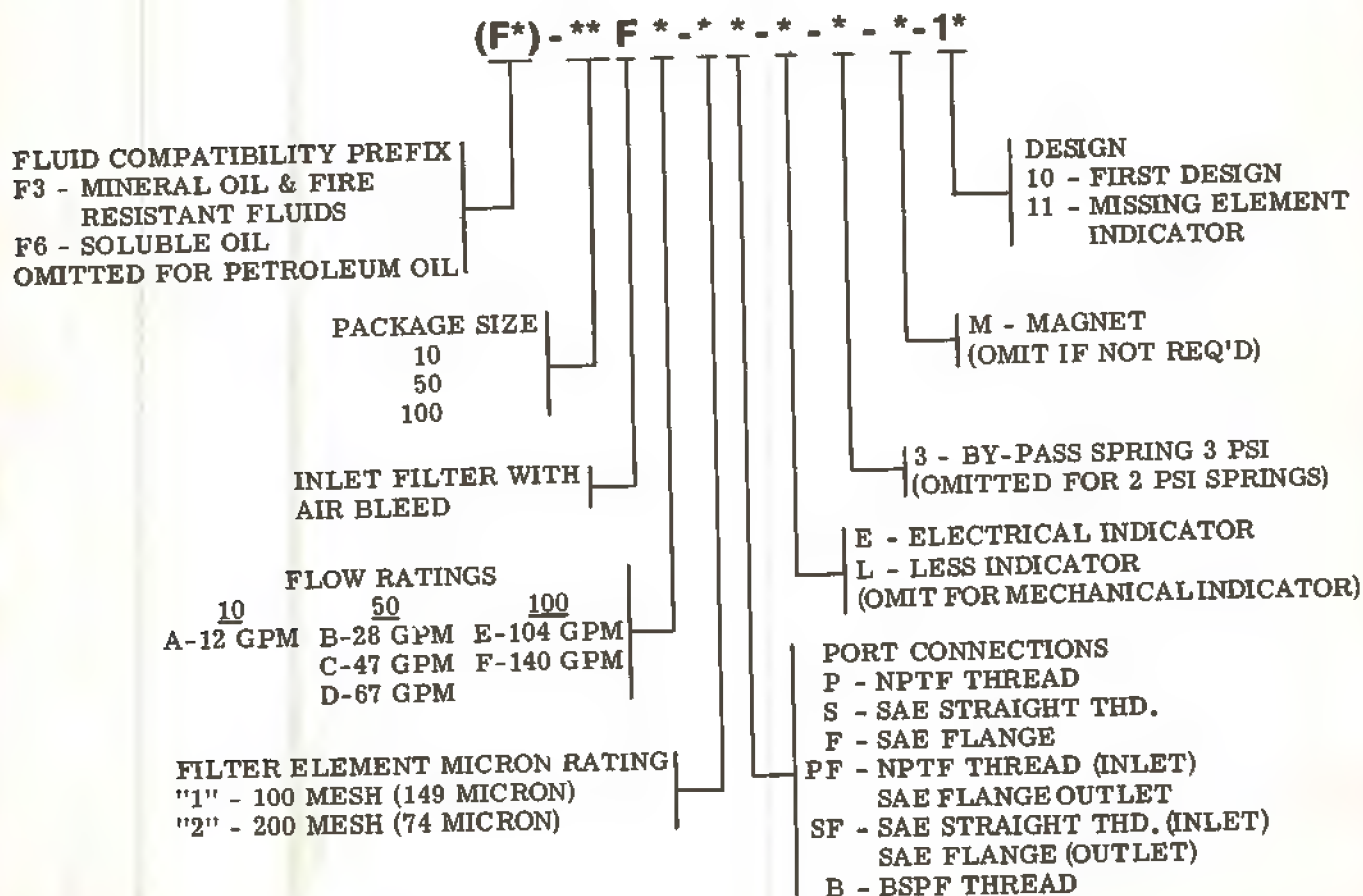
* COAT THREADS WITH LOCTITE SEALANT. TIGHTEN TO LOCKING POSITION THEN BACK OFF 1/4 TURN.

ELECTRICAL INDICATOR COMPONENTS (ALL MODELS)



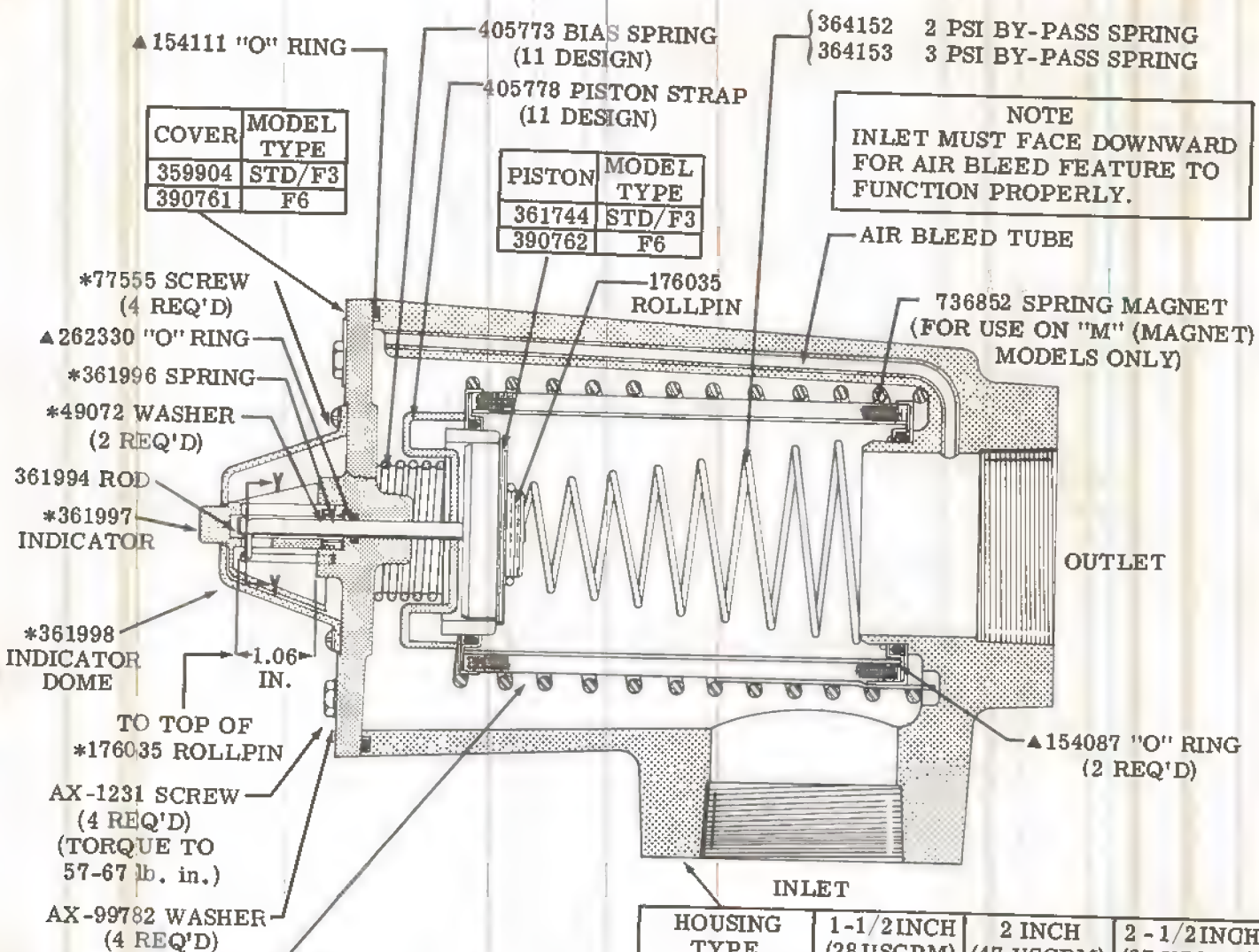
(STD/F3/F6 ELECTRICAL INDICATOR PARTS AVAILABLE IN KIT 942399)

MODEL CODE BREAKDOWN



(F*)-50F*--**-10/11
28,47,&67 GPM INLET FILTER**

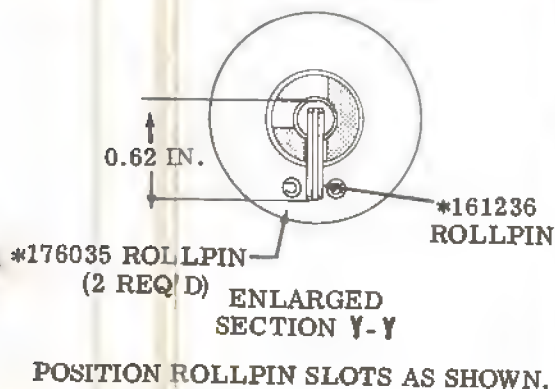
***INCLUDED IN MECHANICAL
INDICATOR KIT 942477**



STD/F3 FILTER ELEMENT KITS			
MODEL	ELEMENT	STD.	F3
50FB-1*-10/11	361991	941056	941057
50FB-2*-10/11	361740	941058	941059
50FC/D-1*-10/11	361992	941060	941061
50FC/D-2*-10/11	361741	941062	941063

HOUSING TYPE	1-1/2 INCH (28 USGPM)	2 INCH (47 USGPM)	2-1/2 INCH (67 USGPM)
"P"	STD/F3 361750	361751	367137
	F6 390753	390754	390755
"S"	STD/F3 367128	367129	—
	F6 390756	390757	—
"F"	STD/F3 367131	367132	367138
	F6 390758	390759	390760
"PF"	STD/F3 573006	573007	573008
	F6 573023	573024	573025
"SF"	STD/F3 573010	573011	—
	F6 573026	573027	—

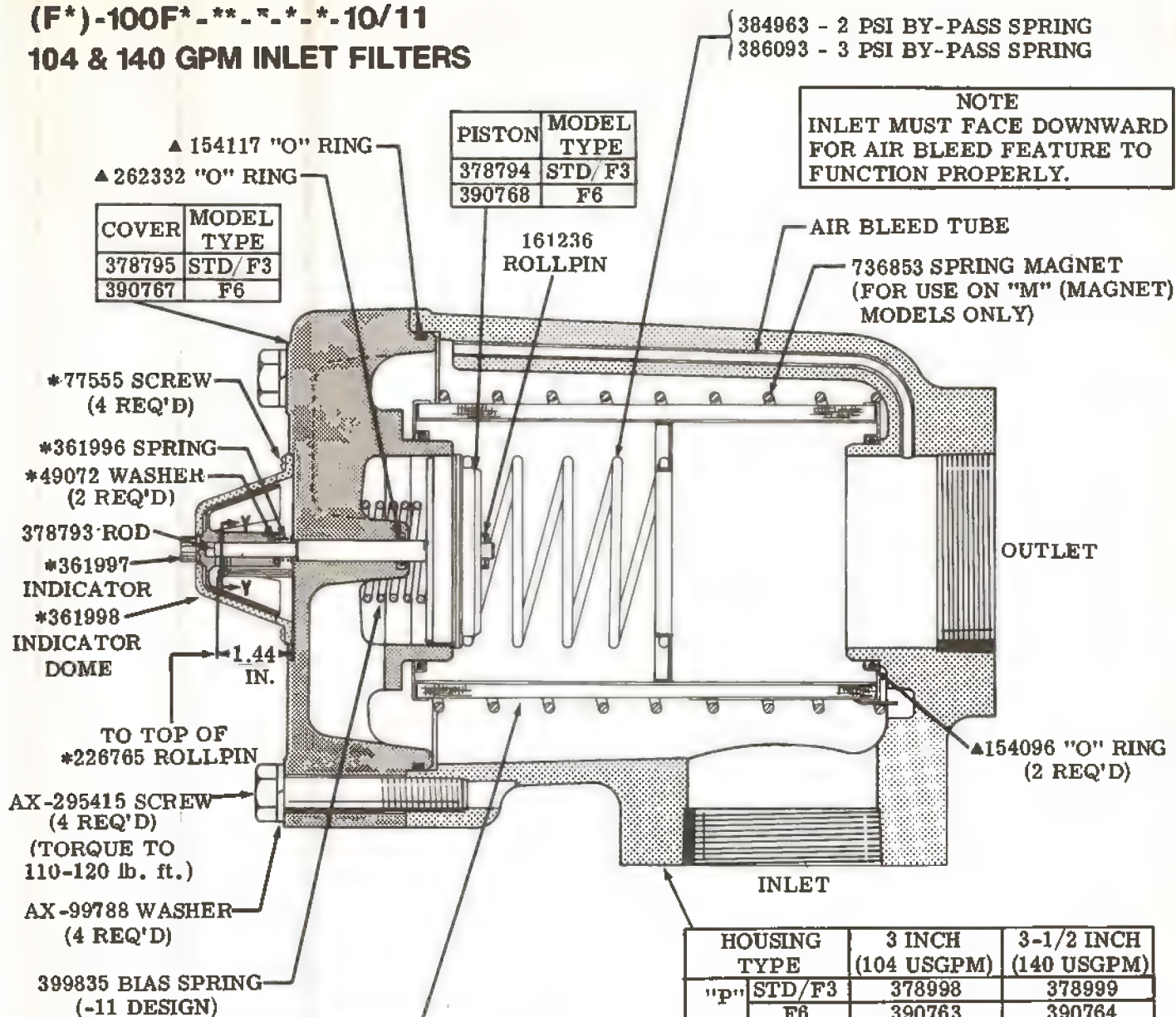
**NOTE - HOUSING TYPES "S" AND "F" CONFORM
TO SAE STANDARDS**



***INCLUDED IN
919643 SEAL KIT
FOR STD & F6.**

**F3 EQUIVALENT
919644 SEAL KIT**

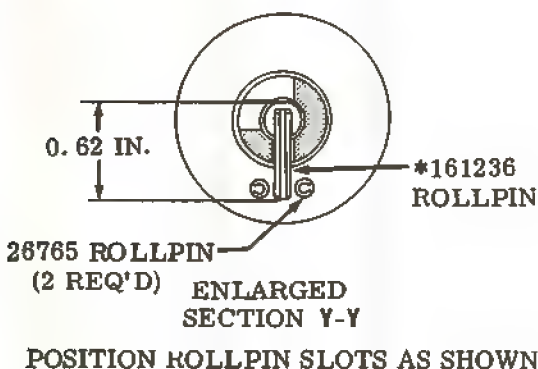
(F*)-100F*--**-10/11**
104 & 140 GPM INLET FILTERS



STD/ F3 FILTER ELEMENT KITS			
MODEL	ELEMENT	STD.	F3
100FE/F-1*-10/11	378991	941064	941065
100FE/F-2*-10/11	378990	941066	941067

HOUSING TYPE		3 INCH (104 USGPM)	3-1/2 INCH (140 USGPM)
"P"	STD/F3	378998	378999
	F6	390763	390764
"F"	STD/F3	378995	378996
	F6	390765	390766
"PF"	STD/F3	573013	573014
	F6	573028	573029

NOTE - HOUSING TYPE "F" CONFORMS
 TO SAE STANDARDS



*INCLUDED IN MECHANICAL
 INDICATOR KIT 942477

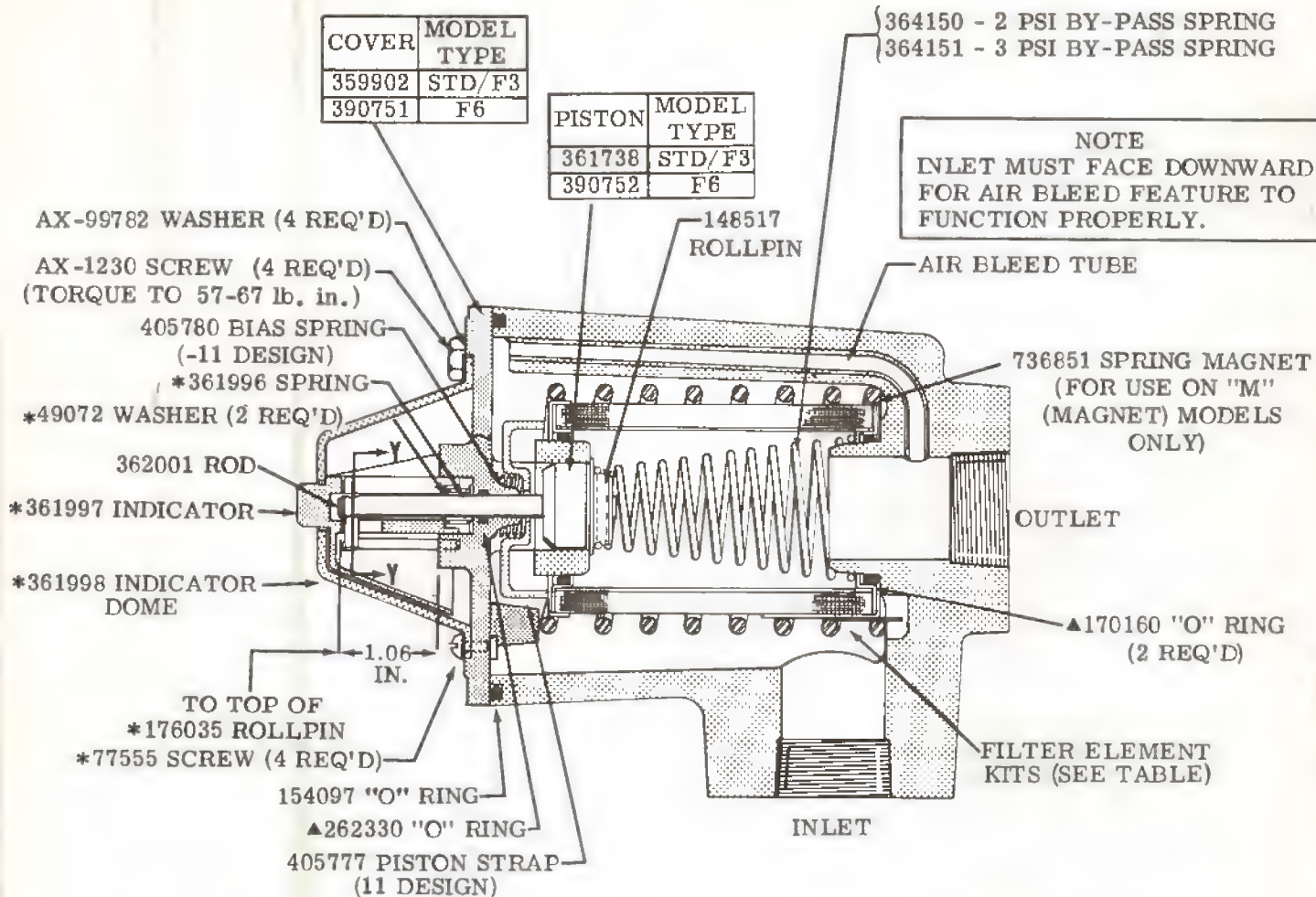
▲INCLUDED IN
 919740 SEAL KIT
 FOR STD & F6.

F3 EQUIVALENT
 919741 SEAL KIT

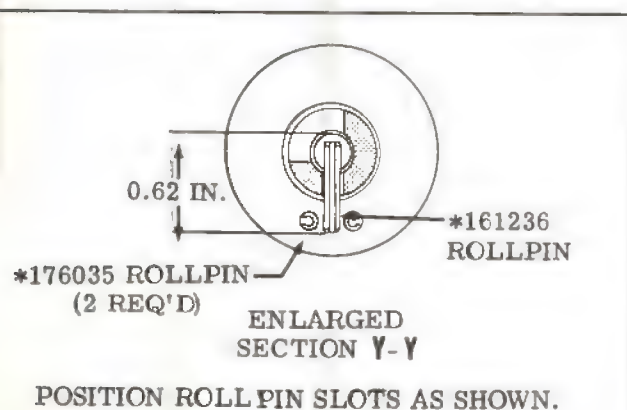


(F*)-10FA-*-**-10/11**
12 GPM INLET FILTER

***INCLUDED IN MECHANICAL
INDICATOR KIT 942477**



HOUSING TYPE	"P" 1 INCH NPTF THD.	"S" - 1 INCH OD TUBE SAE STR. THD.	"F" - 1 INCH PIPE, SAE FLANGE	"PF" INLET - Same as "P" OUTLET - Same as "F"	"SF" INLET - Same as "S" OUTLET - Same as "F"	"B" - G1 (BSPF) THREAD
STD/F3	359906	362000	367126	573003	573004	575965
F6	390748	390749	390750	573021	573022	575966



STD/F3 FILTER ELEMENT KITS			
MODEL	ELEMENT	STD.	F3
10FA-1*-10/11	361990	941052	941053
10FA-2*-10/11	361739	941054	941055

***INCLUDED IN
919641 SEAL KIT
FOR STD & F6.**

**F3 EQUIVALENT
919642 SEAL KIT**

VICKERS

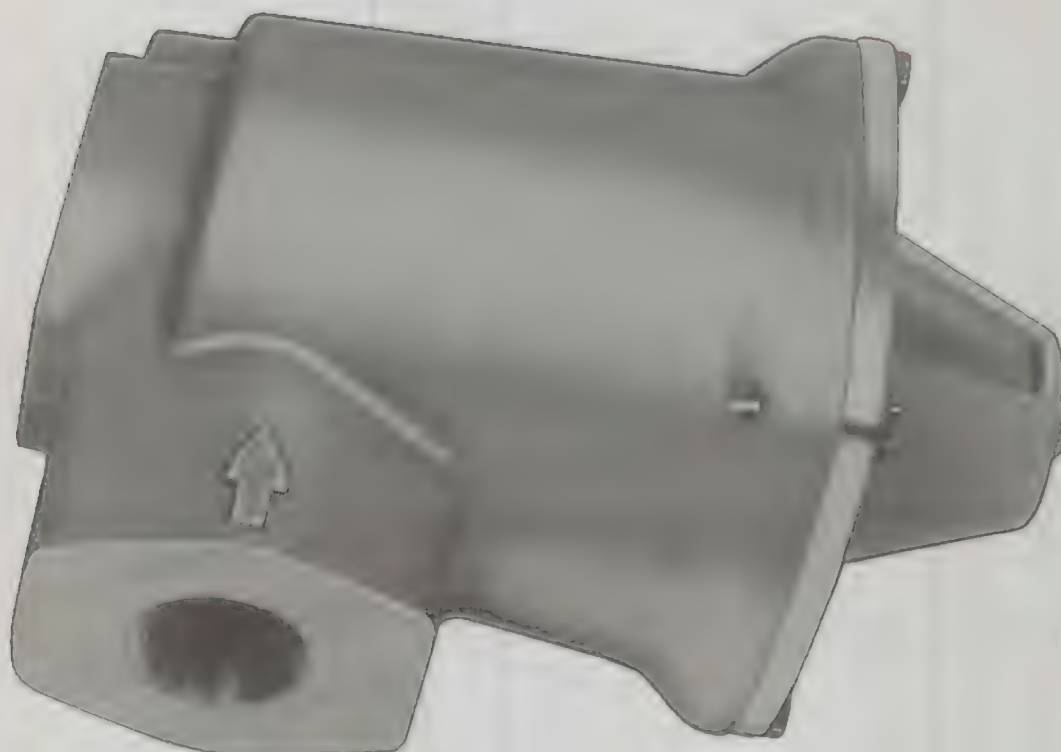
Service Parts Information

**Inlet Filters
With Air Bleed
Feature
Mechanical
Indicator**

(F*)-10FA-**-**-**-10/11

(F*)-50F*-**-**-**-10/11

(F*)-100F*-**-**-**-10/11



Vickers, Incorporated

1401 Crooks Road
Troy, Michigan 48064

Revised 7-1-86

I-3951-S

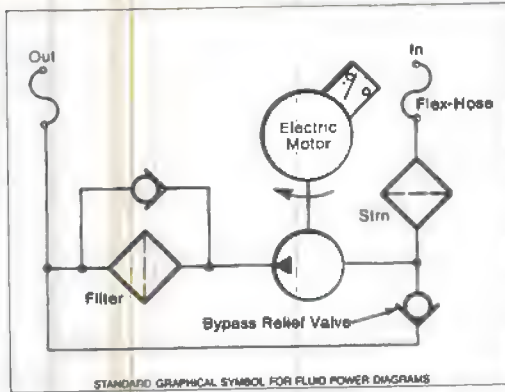
Service Parts Information

VICKERS

A TRIMMOVA COMPANY

PORTA FILTER & TRANSFER UNIT

(F3)PFTU-OFR30
PFTU-OFRS60



895846 HAND TRUCK

895655
ELECTRIC MOTOR
3/4 HP - 1725 RPM - 115
230 V 60 Hz, 1 ϕ , NEMA
STANDARD OPEN TYPE.

895844 FLEXIBLE HOSE
6 FT. - 1" I.D.

895651 FLEXIBLE HOSE
6 FT. - 3/4" I.D.

896994 MOTOR/
PUMP ADAPTER

896237 COUPLING
(MOTOR END)

311890 INSERT

311880 COUPLING
(PUMP END)

OCST-1-08-10 STRAINER

V10-1P5P-1B-20
PUMP (SEE PARTS
DRAWING M-2005-S)

DT8P1-03-65-10 VALVE
(SEE PARTS DRAWING
I-953-S)

OFR30 FILTER SHOWN
(SEE TABLE FOR RE-
PLACEMENT ELEMENTS)
OFR30 SERVICE DWG I-3957-S
OFRS60 INSTALLATION DWG 522145

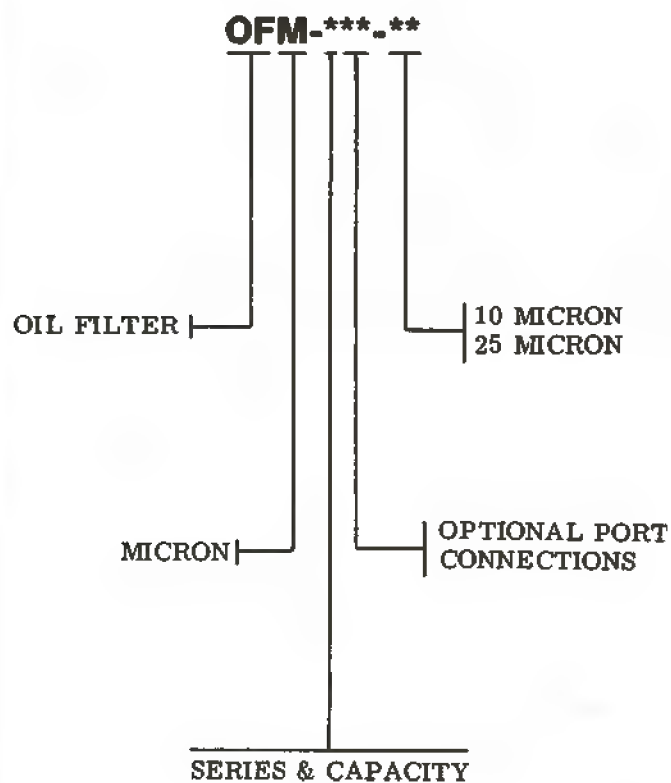
MODEL	ELEMENT KITS	
	3 MICRON	10 MICRON
OFR30	941446	941448
F3-OFR30	941450	941452
OFRS60	941190	941107

Vickers, Incorporated
P.O. Box 302
Troy, Michigan 48007-0302

REVISED 4-1-86

I-3952-S

MODEL CODE BREAKDOWN



OFM FILTERS, IN THEIR STANDARD FORM, ARE APPROVED FOR USE WITH WATER-GLYCOL, PHOSPHATE ESTER AND CHLORINATED HYDROCARBON FIRE-RESISTANT FLUIDS. THEY ARE NOT RECOMMENDED FOR USE WITH WATER AND OIL EMULSIONS.

Litho in U. S. A

Service Parts Information

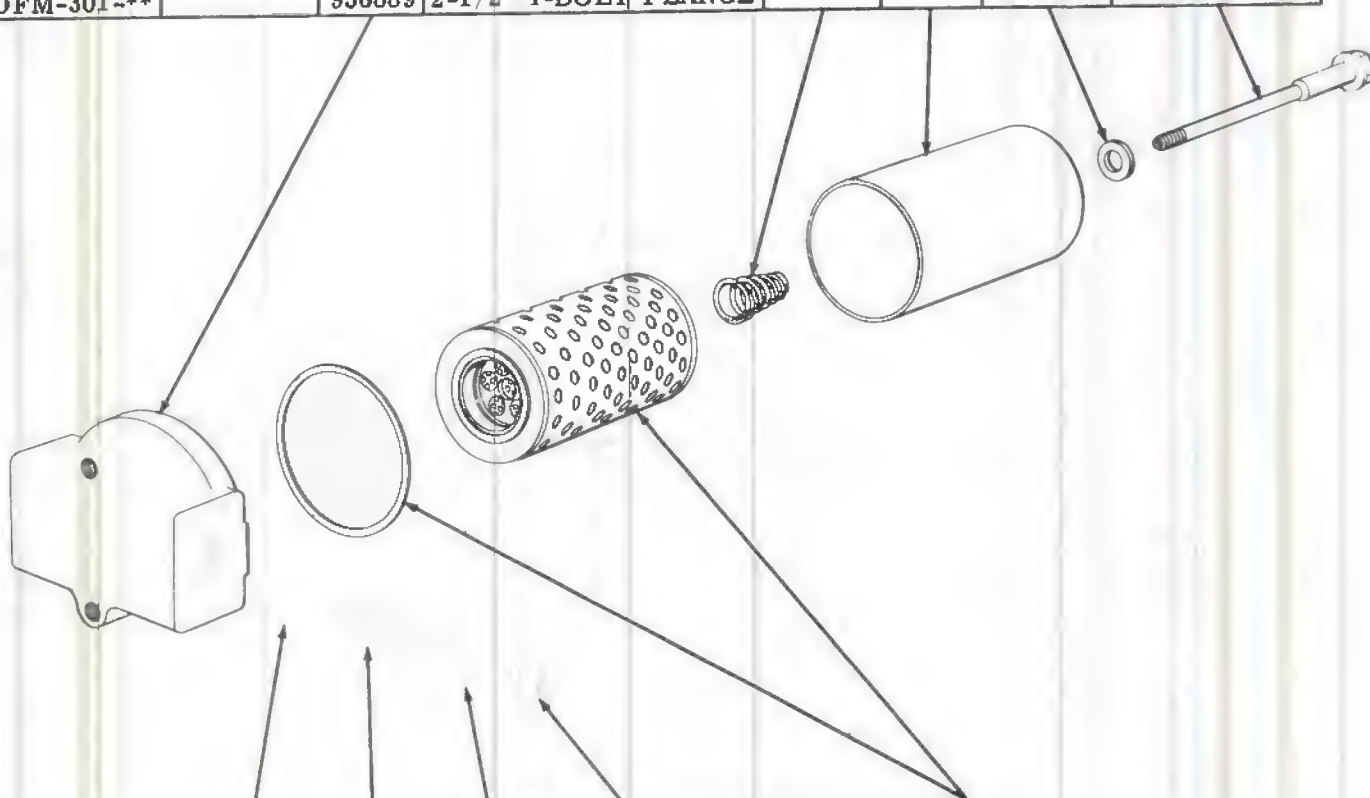
VICKERS

ATRIUM COMPANY

LOW PRESSURE RETURN LINE FILTERS

OFM Series -100, -200 & -300

MODEL	CAPACITY (GPM)	BASE	PORT CONNECTION	SPRING	BODY	SEAL WASHER	BOLT
OFM-100-**	0-50	936965	1" 4-BOLT FLANGE	936955	263231	936949	936947 TORQUE TO 12-15 LB. FT.
OFM-101-**		936967	1" PIPE THREAD				
OFM-102-**		936974	1" TUBE				
OFM-200-**	0-125	936975	1-1/4" 4-BOLT FLANGE	936958	936954	936950	936948 TORQUE TO 30-35 LB. FT.
OFM-201-**		936977	1-1/2" 4-BOLT FLANGE				
OFM-202-**		936978	1-1/2" PIPE THREAD				
OFM-300-**	100-300	936980	2" 4-BOLT FLANGE				
OFM-301-**		936889	2-1/2" 4-BOLT FLANGE				



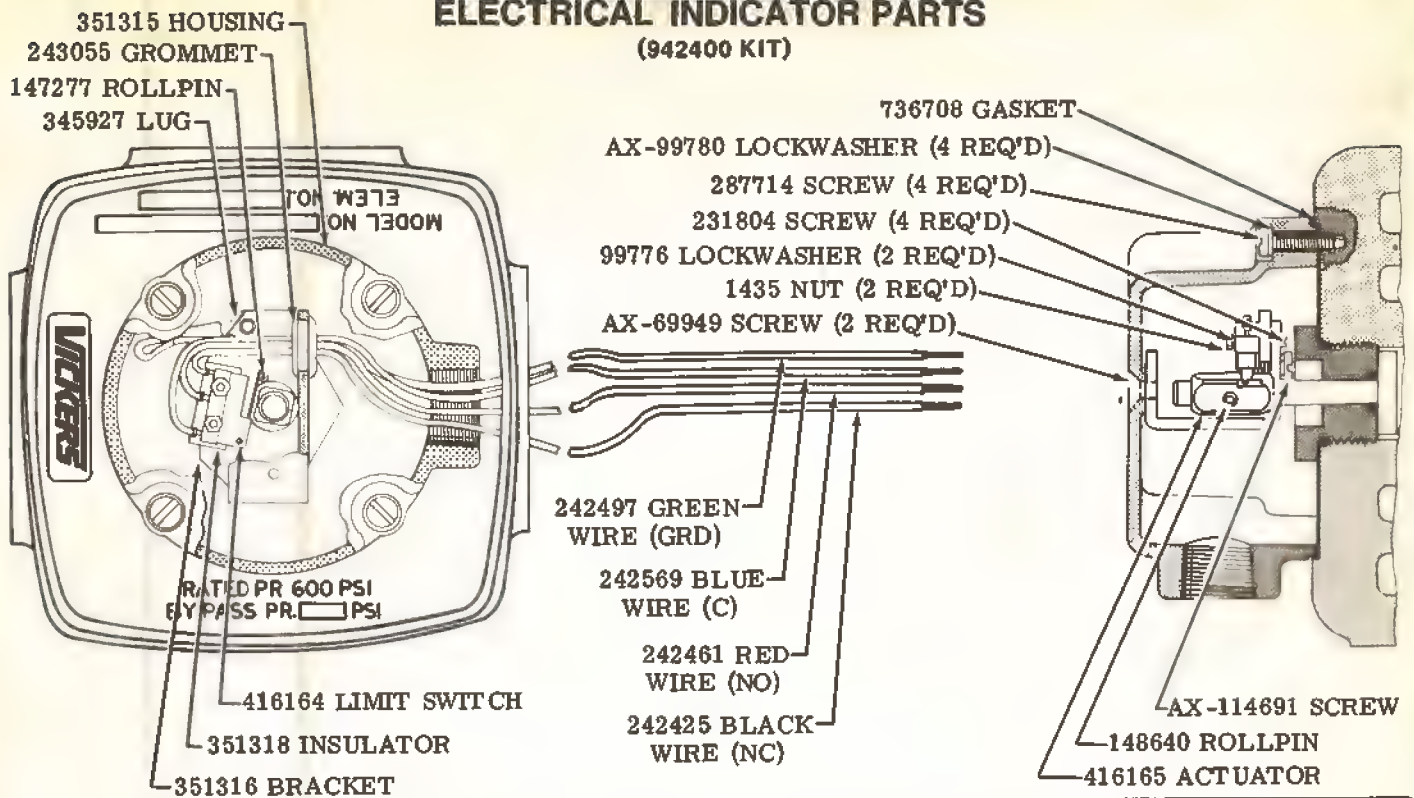
MODEL	POPPET	VALVE SPRING	WASHER	RET	RING	SINGLE FILTER ELEMENT KIT (INCLUDES SEAL)
OFM-1**-10	936944	936941	936375	87764		923069
OFM-1**-25		939000				922788
OFM-2**-10	936945	936942	938376	87885		923070
OFM-2**-25		939001				922789
OFM-3**-10	936946	936943	936854	103824		923070
OFM-3**-25		939002				922789

Vickers, Incorporated
P.O. Box 302
Troy, Michigan 48007-0302

Revised 5-1-85

I-3953-S

ELECTRICAL INDICATOR PARTS (942400 KIT)



MODEL CODE BREAKDOWN

(F3)-OFR-*-*-*-*10

SEALS FOR MINERAL
OIL AND FIRE
RESISTANT FLUIDS

OIL FILTER
RETURN LINE

FLOW RATING - USGPM
15 USGPM - OFR-15
30 USGPM - OFR-30
60 USGPM - OFR-60
120 USGPM - OFR-120

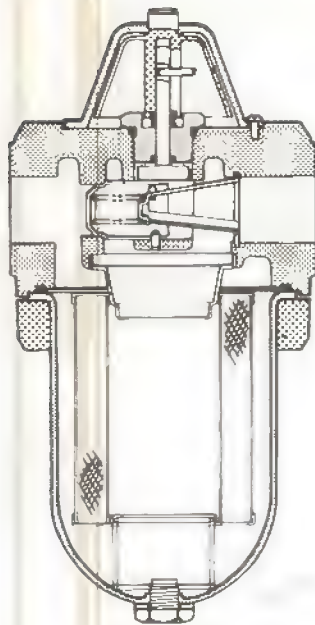
PORT CONNECTIONS
B - G1 (BSPF) THREADS
(15 & 30 USGPM ONLY)
F - SAE FLANGE
P - NPT F THREAD
S - SAE STR. THREAD

DESIGN

BY-PASS PRESSURE SETTING
BLANK - 25 PSI
35 - 35 PSI

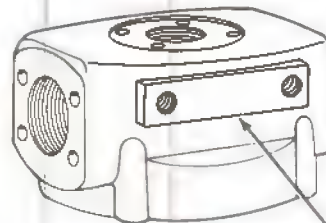
INDICATOR TYPE
E - ELECTRICAL INDICATOR
L - LESS INDICATOR
BLANK - MECHANICAL INDICATOR

NOMINAL FILTRATION
3M - 3 MICROMETRE
7G - 7 MICROMETRE
(GLASS MEDIA)
7M - 7 MICROMETRE
BLANK - 10 MICROMETRE



(F3)-OFR-60-*(-)-10
(F3)-OFR-120-*(-)-10

- 77555 SCREW (4 REQ'D)
- 105109 WASHER
- 361996 SPRING
- 421311 PLUG
- 263069 SEAL
- 262330 SEAL
- 105109 WASHER
- 218979 PIN
- 361998 INDICATOR DOME
- 361997 INDICATOR
- 407949 RETAINING RING
- 422192 INDICATOR SHAFT (CHECK FOR FREEDOM OF MOVEMENT AFTER ASSY.)
- 736141 SPRING RETAINER



P-NPTF THREAD	S-SAE STR THREAD	F - SAE FLANGE
941421	941422	941423

736140 BYPASS PISTON

148640 ROLL PIN

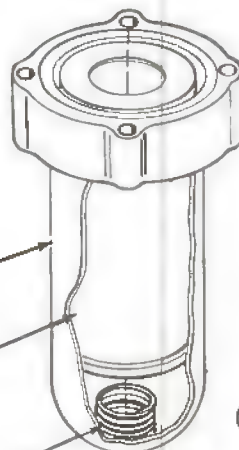
420606 BYPASS SPRING (25 PSI)

736831 BYPASS SPRING (35 PSI)

405776 CAUTION TAG (USED ON "P" NPTF THREAD UNITS ONLY)

- 590021 STD SEAL
- 591761 F3 SEAL

CTURED
LARGE
NDARD).
OR MIN-
UIDS.



736424 BOWL S/A (OFR-60)

■OFR-60 FILTER ELEMENT (SEE TABLE)

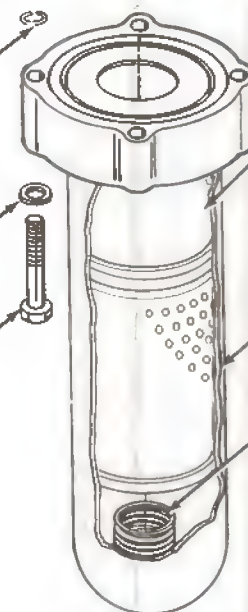
736145 SPRING

AX-185636 SCREW RETAINER (8 REQ'D FOR EACH UNIT)

AX-233114 WASHER (4 REQ'D FOR EACH UNIT)

AX-1297 SCREW (4 REQ'D FOR EACH UNIT) (TORQUE 15-20 lb.ft.)

- 936949 SEAL WASHER
- 736223 DRAIN PLUG



■OFR-120 FILTER ELEMENT (SEE TABLE)

736445 BOWL S/A (OFR-120)

736145 SPRING

ANICAL INDICATOR
OTED WITH A "●"
(LESS INDICATOR)
PAGE FOR ELEC-
ARTS.

■INCLUDED IN ELEMENT KIT		
ELEMENT TYPE	■STD	■F3
OFR-60-*-3	941409	941417
OFR-60-*-7G	926513	926517
OFR-60-*-7M	926515	926519
OFR-60-*-10	941411	941419
OFR-120-*-3	941410	941418
OFR-120-*-7G	926514	926518
OFR-120-*-7M	926516	926520
OFR-120-*-10	941412	941420

- 936949 SEAL WASHER
- 736223 DRAIN PLUG

(F3)-OFR-15-*-(*)-10
(F3)-OFR-30-*-(*)-10

HEAD SUBASSEMBLY			
P - NPTF THREAD	S - SAE STR THREAD	F - SAE FLANGE	B - G1 (BSPF) THREAD
941453	941454	941455	941456

●361998 INDICATOR DOME
●77555 SCREW (4 REQ'D)

●361997 INDICATOR

●105109 WASHER

●361996 SPRING

●407949 RETAINING RING

421311 PLUG

263069 SEAL

262330 SEAL

105109 WASHER

●218979 PIN

422192 INDICATOR SHAFT
(CHECK FOR FREEDOM OF
MOVEMENT AFTER ASSY.)

736316 SPRING
RETAINER

HEAD S/A
(SEE TABLE)

405776 CAUTION TAG (USED ON "P"
NPTF THREAD UNITS ONLY)

■226214 STD SEAL
■262422 F3 SEAL

736317 PISTON

148640 ROLL PIN

399836 BYPASS
SPRING (25 PSI)

736432 BOWL S/A
(OFR-15)

■OFR-15
FILTER
ELEMENT
(SEE TABLE)

736318 SPRING

936949 SEAL WASHER

736223 DRAIN PLUG

AX-110405 SCREW
RETAINER (8 REQ'D
FOR EACH UNIT)

AX-233113 WASHER
(4 REQ'D FOR
EACH UNIT)

AX-1276 SCREW
(4 REQ'D FOR EACH UNIT)
(TORQUE 15-20 lb.ft.)

NOTE: THESE UNITS ARE MA
WITH ALL SEALS F3 EXCEP
BOWL SEAL WHICH IS NITRIL
CHANGE THE BOWL SEAL TO
ERAL OIL AND FIRE RESISTA

736433 BOWL S/A
(OFR-30)

■OFR-30 FILTER ELEMEN
(SEE TABLE)

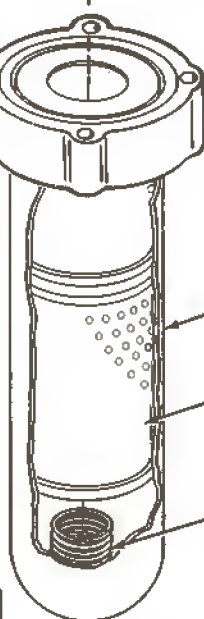
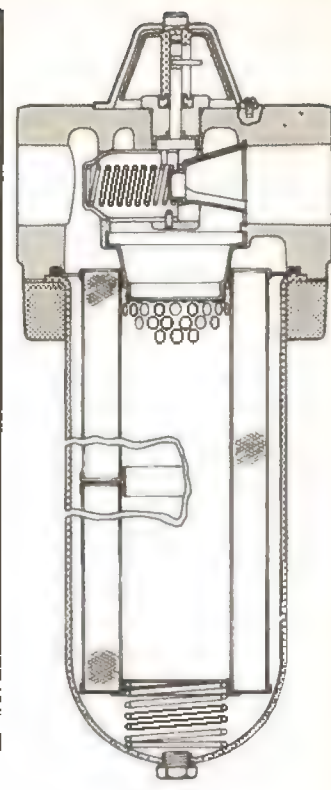
736318 SPRING

■INCLUDED IN ELEMENT KIT		
ELEMENT TYPE	■STD	■F3
OFR-15-*-3	941445	941449
OFR-15-*-7G	926521	926525
OFR-15-*-7M	926523	926527
OFR-15-*-10	941447	941451
OFR-30-*-3	941446	941450
OFR-30-*-7G	926522	926526
OFR-30-*-7M	926524	926528
OFR-30-*-10	941448	941452

●INCLUDED IN
KIT 941003. PA
ARE OMITTED O
MODELS. SEE
TRICAL INDICA'

936949 SEAL WASHER

736223 DRAIN PLUG



VICKERS®

A TRIMONA COMPANY

Service Parts Information

**Large
Return
Line
Filter**

(F3)-OFR-15-*-(*)-10

(F3)-OFR-30-*-(*)-10

(F3)-OFR-60-*-(*)-10

(F3)-OFR-120-*-(*)-10



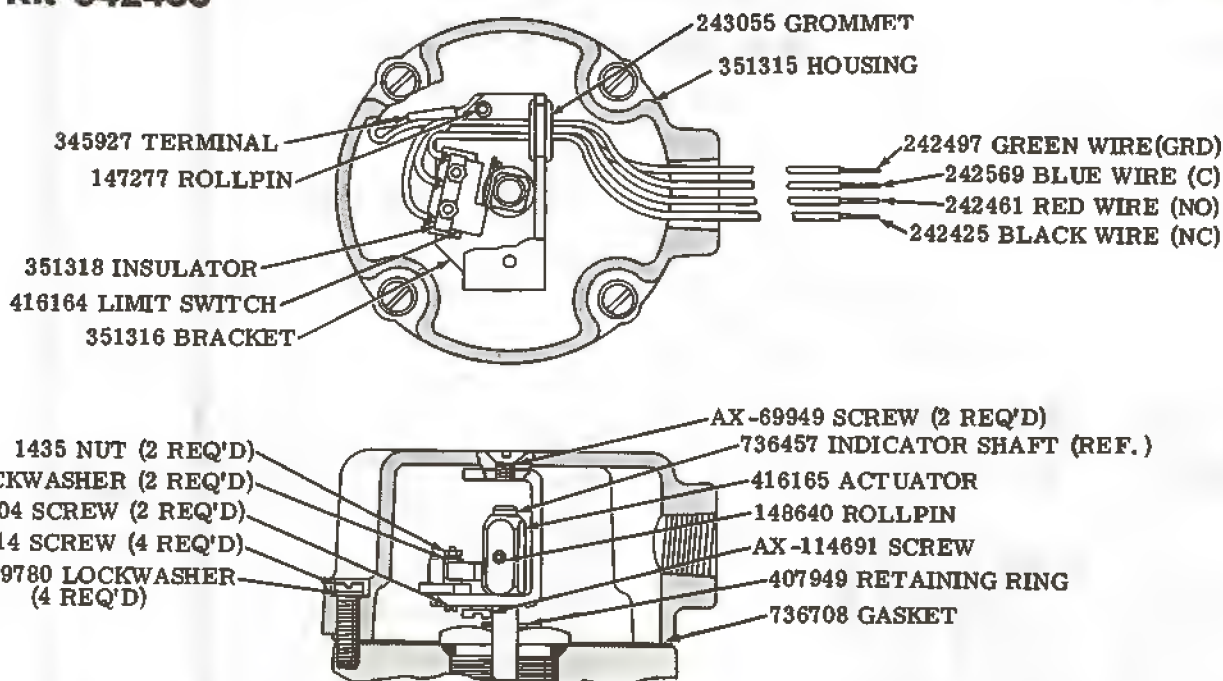
Vickers, Incorporated

P.O. Box 302
Troy, Michigan 48007-0302

Revised 9-1-85

I-3957-S

Electrical Indicator Parts Kit 942400



MODEL CODE BREAKDOWN

(F3)-OFF--**-**-10**

MULTI-FLUID
CAPABILITY
(VITON SEALS)

PRESSURE LINE
OIL FILTERS

FLOW RATING
USGPM
15 - 15 USGPM
35 - 35 USGPM

PORT CONNECTIONS
F - SAE 4 BOLT FLANGE
P - 1" NPTF
S - SAE STR. THD.

DESIGN

INDICATOR
E - ELECTRICAL
L - LESS INDICATOR
BLANK - MECHANICAL

BY-PASS SETTING
BLANK - 40 PSI
STANDARD

NOMINAL
FILTRATION RATING
3M - 3 MICRON
BLANK - 10 MICRON

Service Parts Information

VICKERS

A TRIMONA COMPANY

Pressure
Line
Filters

(F3)-OFP-15-*-*-*-*10

(F3)-OFP-35-*-*-*-*10

● INCLUDED IN MECHANICAL
INDICATOR KIT 941003
□ OMIT ON "L" MODELS

PART NAME	PART NUMBER	
	OFP-15	OFP-35
PLUG	329463	326976
"O" RING	154129	154131
SPRING	736436	736463
SPOOL	736590	736591
BEZEL	736413	736470
*SEAL	154018	154022
*BOWL	380648	200162
"O" RING		
BOWL	736438	736471
SPRING		
BOWL	736440	736447

BEZEL (SEE TABLE)
(TORQUE 71-78 lb. ft.)

*SEAL (SEE TABLE)

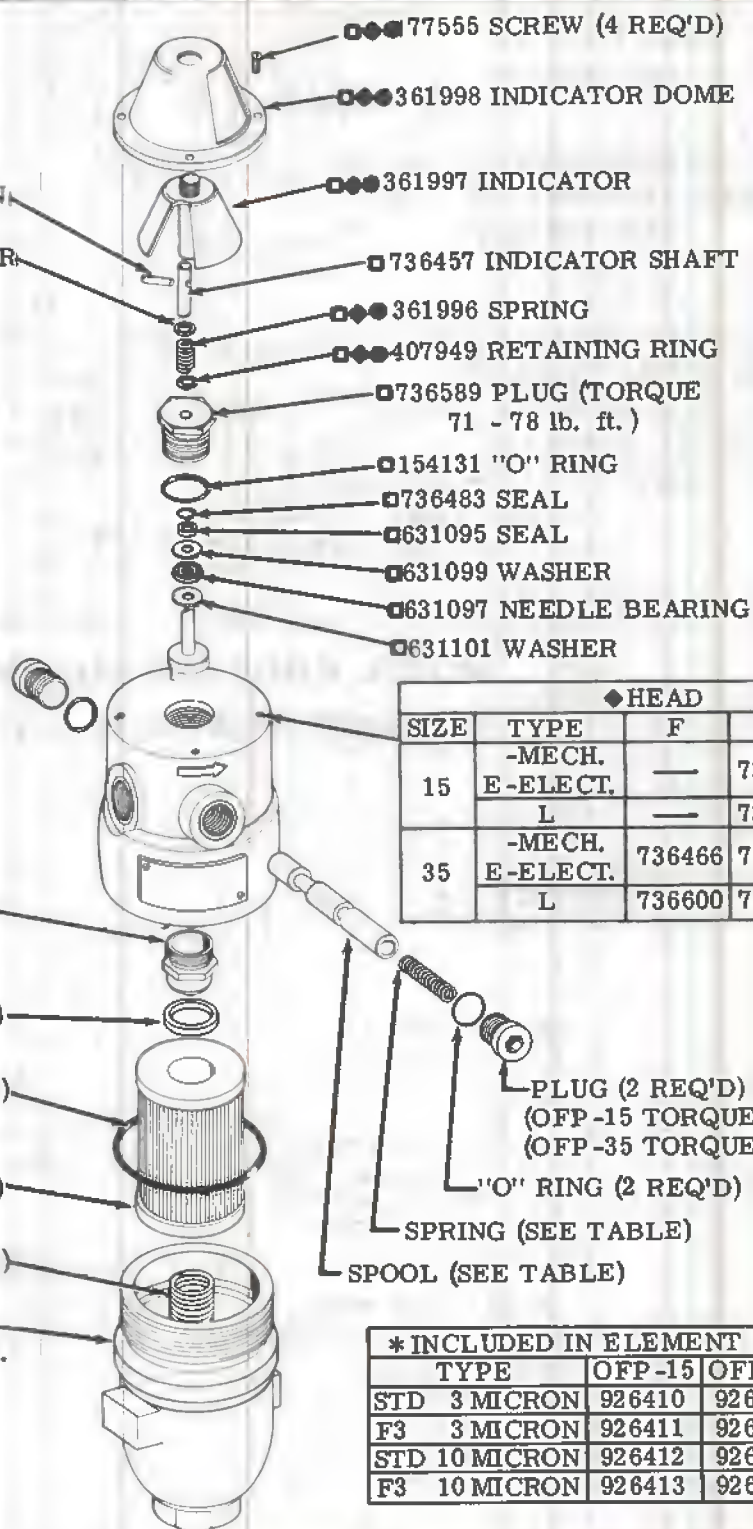
*BOWL "O" RING (SEE TABLE)

*ELEMENT (SEE TABLE)

BOWL SPRING (SEE TABLE)

◆ BOWL (SEE TABLE)
TORQUE 100-110 lb. ft.

◆ NOT AVAILABLE FOR SALE
AS INDIVIDUAL PARTS



◆ HEAD				
SIZE	TYPE	F	P	S
15	-MECH.	—	736418	736419
	E-ELECT.	—	736592	736593
	L	—	736592	736593
35	-MECH.	736466	736467	736468
	E-ELECT.	736466	736467	736468
	L	736600	736601	736602

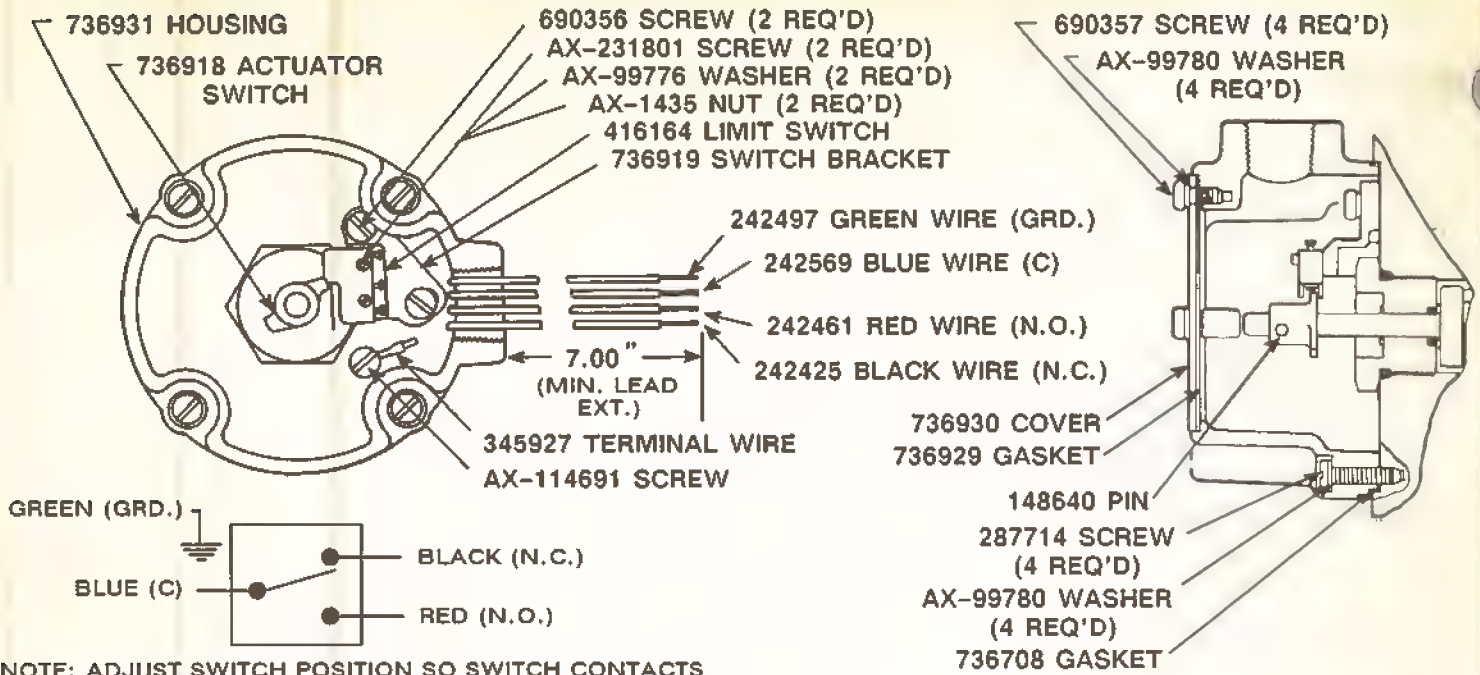
* INCLUDED IN ELEMENT KIT			
	TYPE	OFP-15	OFP-35
STD	3 MICRON	926410	926414
F3	3 MICRON	926411	926415
STD	10 MICRON	926412	926416
F3	10 MICRON	926413	926417

Vickers, Incorporated
P.O. Box 302
Troy, Michigan 48007-0302

Revised 5-1-87

I-3958-S

ELECTRICAL INDICATOR PARTS (KIT 926586)



MODEL CODE BREAKDOWN

(F3) - OFR - * - * - (*) - (*) - (*) - *

1 2 3 4 5 6 7 8

1 SPECIAL SEALS

SEALS FOR MINERAL OIL & FIRE RESISTANT FLUIDS

2 OIL FILTER

RETURN LINE

3 FLOW RATING - USGPM

15 (SHORT) - 15 USGPM 60 (SHORT) - 60 USGPM
30 (LONG) - 30 USGPM 120 (LONG) - 120 USGPM

4 PORT CONNECTIONS

B - G1 (BSPF) THREAD (15 & 30 USGPM ONLY)
F - SAE FLANGE
P - NPTF THREAD
S - SAE STRAIGHT THREAD

5 NOMINAL FILTRATION RATING

3M - 3 MICROMETRE
7G - 7 MICROMETRE (GLASS MEDIA)
7M - 7 MICROMETRE
BLANK - 10 MICROMETRE

6 INDICATOR TYPE

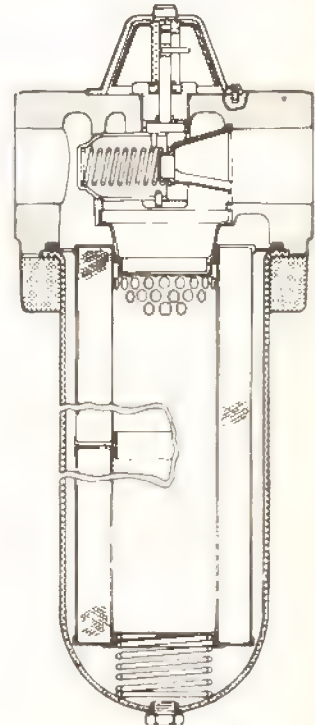
E - ELECTRICAL INDICATOR
BLANK - MECHANICAL INDICATOR

7 BY-PASS PRESSURE SETTING

35 - 35 PSI
BLANK - 25 PSI

8 DESIGN

11 - MECHANICAL INDICATOR
20 - ELECTRICAL INDICATOR

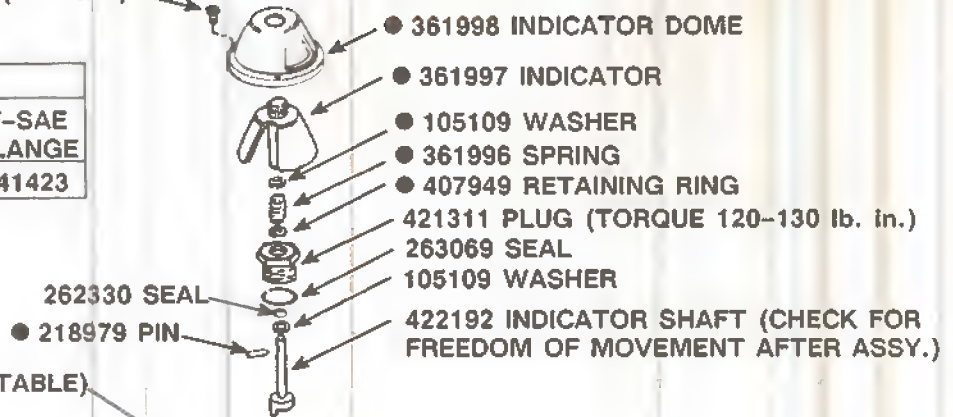


SECTIONAL VIEW
(OFR-60/120 SHOWN)

OFR-60-*-(*)-(*)-(*)-11/20
OFR-120-*-(*)-(*)-(*)-11/20

● 690357 SCREW (4 REQ'D)

HEAD SUBASSEMBLY			
MODEL	P-NPTF THD.	S-SAE STR THD.	F-SAE FLANGE
OFR-60/120	941421	941422	941423



HEAD S/A (SEE TABLE)

BYPASS SPRING
(SEE TABLE)

736140 PISTON

148640 PIN

MODEL	BYPASS SPRING	SPRING RATE
OFR-60/120	420806	25 PSI
	736831	35 PSI

405776 CAUTION TAG (USED ON 'P' NPTF THREAD UNITS ONLY)

■ 590021 STD. BOWL SEAL
■ 591761 F3 BOWL SEAL

736424 BOWL S/A
(OFR-60)

■ OFR-60 SHORT
FILTER ELEMENT
(SEE TABLE)

736145 SPRING

936949 SEAL WASHER

736223 DRAIN PLUG

AX-185636
SCREW RETAINER
(8 REQ'D FOR
EACH UNIT)

AX-233114 WASHER
(4 REQ'D FOR
EACH UNIT)

AX-1297 SCREW
(4 REQ'D FOR
EACH UNIT)

736445 BOWL S/A
(OFR-120)

■ OFR-120 LONG
FILTER ELEMENT
(SEE TABLE)

736145 SPRING

936949 SEAL WASHER

736223 DRAIN PLUG

■ FILTER ELEMENT KIT

ELEMENT TYPE	STD.	F3
OFR-60-*--3M	941409	941417
OFR-60-*--7G	926513	926517
OFR-60-*--7M	926515	926519
OFR-60-*--10	941411	941419
OFR-120-*--3M	941410	941418
OFR-120-*--7G	926514	926518
OFR-120-*--7M	926516	926520
OFR-120-*--10	941412	941420

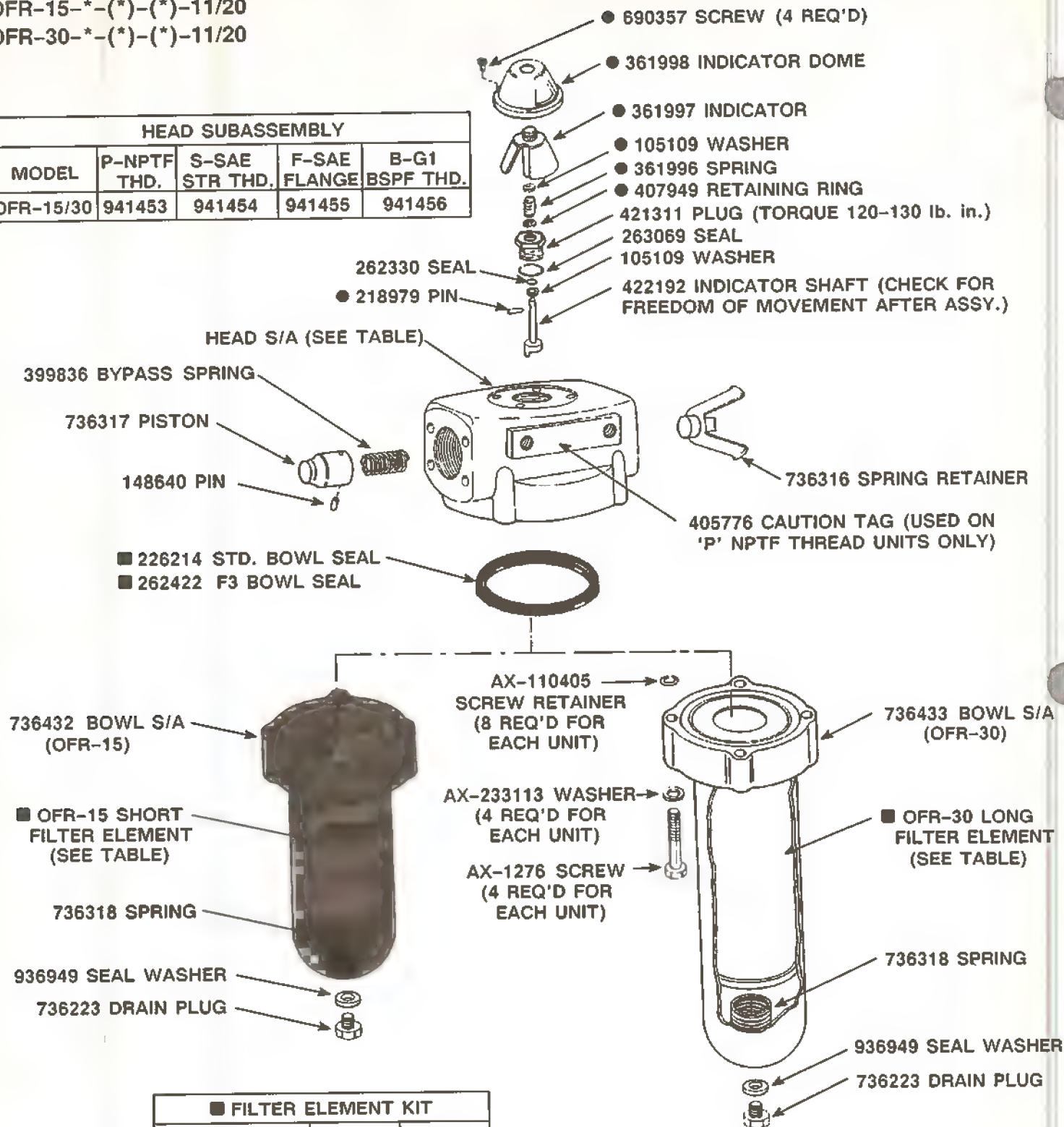
■ - INCLUDED IN FILTER ELEMENT KIT

● - INCLUDED IN MECHANICAL INDICATOR KIT 941003.
SEE BACK PAGE FOR 'E' (ELECTRICAL INDICATOR)
PARTS.

OFR-15-*-(*)-(*)-11/20

OFR-30-*-(*)-(*)-11/20

HEAD SUBASSEMBLY				
MODEL	P-NPTF THD.	S-SAE STR THD.	F-SAE FLANGE	B-G1 BSPF THD.
OFR-15/30	941453	941454	941455	941456



■ FILTER ELEMENT KIT		
ELEMENT TYPE	STD.	F3
OFR-15-* -3M	941445	941449
OFR-15-* -7G	926521	926525
OFR-15-* -7M	926523	926527
OFR-15-* -10	941447	941451
OFR-30-* -3M	941446	941450
OFR-30-* -7G	926522	926526
OFR-30-* -7M	926524	926528
OFR-30-* -10	941448	941452

NOTE
ALL UNITS ARE MANUFACTURED WITH F3 SEALS, EXCEPT THE BOWL SEAL, WHICH IS NITRILE (STANDARD).

VICKERS®

A TRINOVIA COMPANY

Service Parts Information

**LARGE RETURN
LINE FILTER**

(F3)-OFR-15-*-(*)-(*)-11/20

(F3)-OFR-30-*-(*)-(*)-11/20

(F3)-OFR-60-*-(*)-(*)-(*)-11/20

(F3)-OFR-120-*-(*)-(*)-(*)-11/20



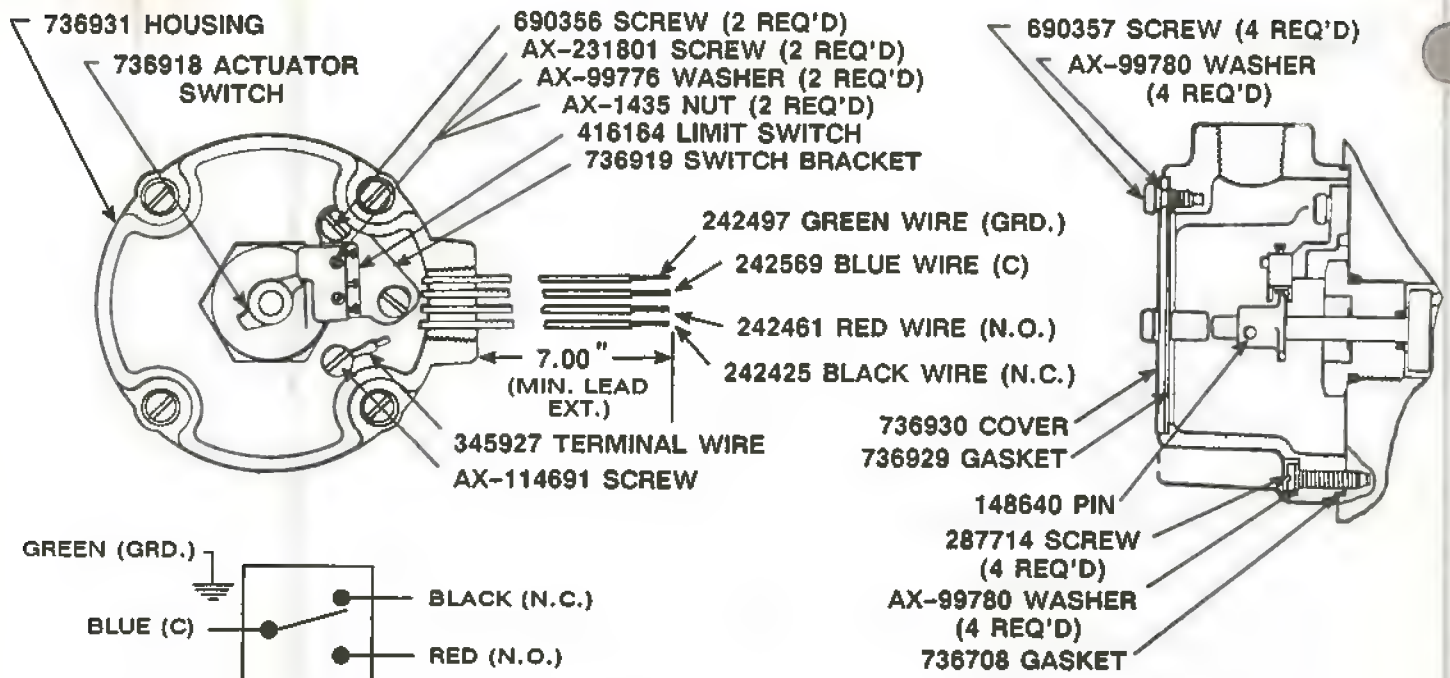
Vickers, Incorporated

P.O. Box 302
Troy, Michigan 48007-0302

Released 11-1-87

I-3959-S

ELECTRICAL INDICATOR PARTS (KIT 926586)



NOTE: ADJUST SWITCH POSITION SO SWITCH CONTACTS MAKE AND BREAK WITH BY-PASS VALVE PISTON MOVEMENT BETWEEN SEATED AND .12 INCH OPEN.

MODEL CODE BREAKDOWN

(F3) - OFF - * - * - * - * - * - *

1 2 3 4 5 6 7 8

1 SPECIAL SEALS

SEALS FOR MINERAL OIL &
FIRE RESISTANT FLUIDS

2 OIL FILTER - PRESSURE LINE

3 FLOW RATING - USGPM

15 - 15 USGPM
35 - 35 USGPM

4 PORT CONNECTIONS

15 SIZE:
P - 3/4" NPTF THREADS
S - SAE STRAIGHT THREADS
35 SIZE:
B - G1 BSPF THREADS
F - SAE 4 BOLT FLANGE
P - 1" NPTF THREADS
S - SAE STRAIGHT THREADS

5 NOMINAL FILTRATION RATING

3M - 3 MICRON
BLANK - 10 MICRON

6 BY-PASS PRESSURE SETTING

BLANK - 40 PSI (STD.)

7 INDICATOR

E - ELECTRICAL
L - LESS INDICATOR
BLANK - MECHANICAL

8 DESIGN

11 - MECHANICAL INDICATOR
20 - ELECTRICAL INDICATOR

Service Parts Information



Pressure
Line
Filters

(F3)-OFP-15-*-*-*-*11/20

(F3)-OFP-35-*-*-*-*11/20

○ - NOT AVAILABLE FOR SALE
AS INDIVIDUAL PARTS

● - INCLUDED IN MECHANICAL
INDICATOR KIT 926588

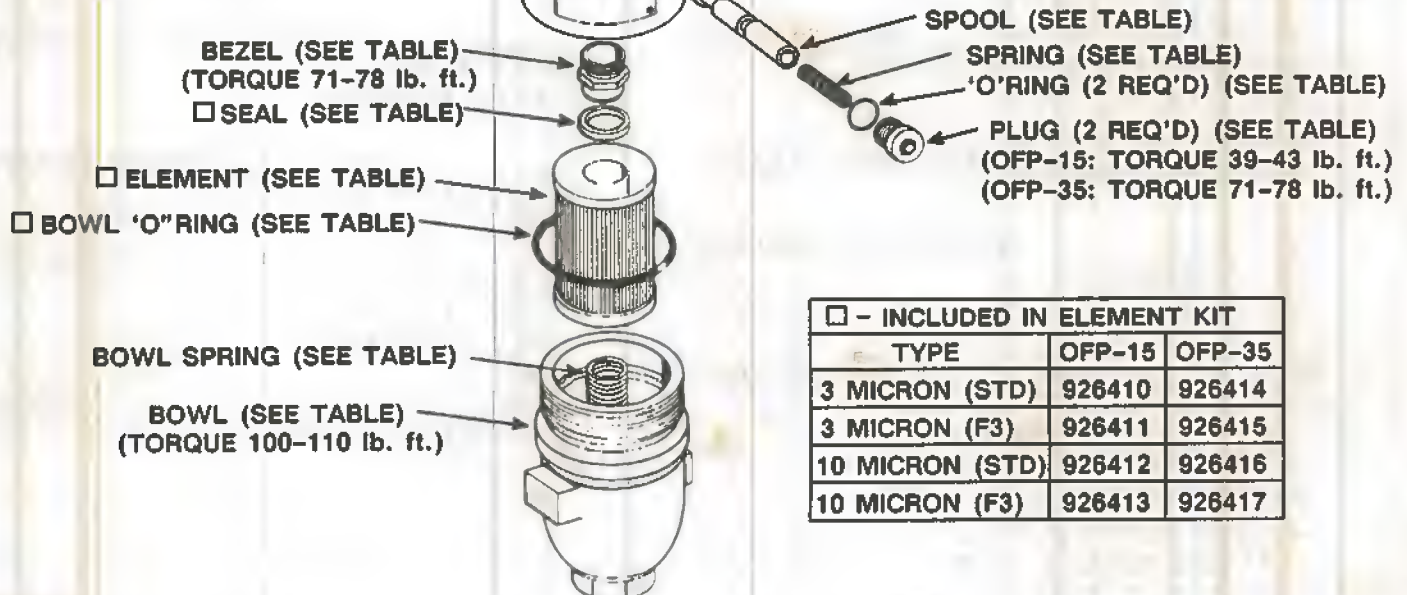
■ - OMIT ON 'L' MODELS

PART NAME	PART NUMBER	
	OFP-15	OFP-35
PLUG	329463	326976
'O' RING	154129	154131
SPRING	736436	736463
SPOOL	736590	736591
BEZEL	736413	736470
SEAL	154018	154022
BOWL 'O' RING	380648	200162
BOWL SPRING	736438	736471
BOWL	736440	736447

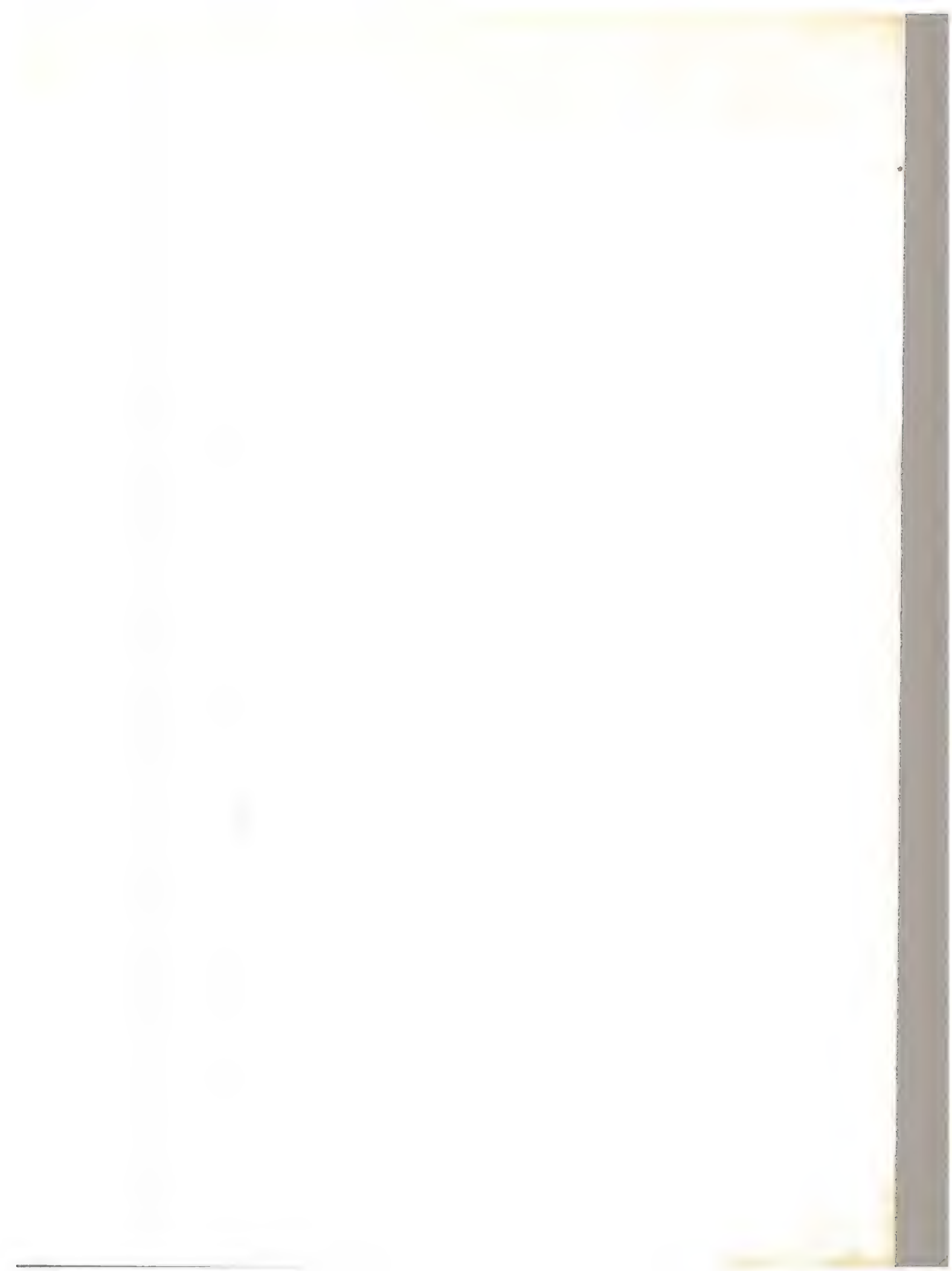
■ ○ ● 218979 PIN
■ ○ ● 49072 WASHER

■ ○ ● 690357 SCREW (4 REQ'D)
■ ○ ● 361998 INDICATOR DOME
■ ○ ● 361997 INDICATOR
■ 736457 INDICATOR SHAFT
■ ○ ● 361996 SPRING
■ ○ ● 407949 RETAINING RING
■ 736589 PLUG (TORQUE 71-78 lb. ft.)
■ 154131 'O' RING
■ 736483 SEAL
■ 631095 SEAL
■ 631099 WASHER
■ 631097 NEEDLE BEARING
■ 631101 WASHER

FILTER TYPE		O HEAD TYPE			
SIZE	INDICATOR	B	F	P	S
15	MECH.	—	—	736418	736419
	E-ELECT.	—	—	736592	736593
	L	—	—	736592	736593
35	MECH.	736469	736466	736467	736468
	E-ELECT.	736603	736600	736601	736602
	L	736603	736600	736601	736602



■ - INCLUDED IN ELEMENT KIT		
TYPE	OFP-15	OFP-35
3 MICRON (STD)	926410	926414
3 MICRON (F3)	926411	926415
10 MICRON (STD)	926412	926416
10 MICRON (F3)	926413	926417



(F*)-100F*-**-*-**-12/20
97 & 140 GPM INLET FILTER

384963 - 2 PSI BY-PASS SPRING
386093 - 3 PSI BY-PASS SPRING

PISTON	FLUID TYPE
378794	STD/F3
390768	F6

399835 BIAS SPRING

COVER	FLUID TYPE
378795	STD/F3
390767	F6

AIR BLEED TUBE
□ ELEMENT (SEE TABLE)

161236 PIN

AX-99788 WASHER (4 REQ'D)

AX-295415 SCREW (4 REQ'D)
(TORQUE TO 110-120 lb. ft.)

● 690357 SCREW (4 REQ'D)

378793 ROD

● 361998 INDICATOR DOME

● 361997 INDICATOR

ROLL PINS
(SEE SECTION Y-Y)

● 49072 WASHER
(2 REQ'D)

● 361996 SPRING

●▲ 262332 'O'RING

□▲ 154096 'O'RING
(2 REQ'D)

□▲ 154117 'O'RING

405776 CAUTION TAG
(USE ON 'P' & 'PF'
MODELS ONLY)

736853 SPRING MAGNET
(USE ON 'M' MODELS ONLY)

NOTE
INLET PORT MUST FACE DOWN-
WARD FOR AIR BLEED FEATURE
TO FUNCTION PROPERLY.

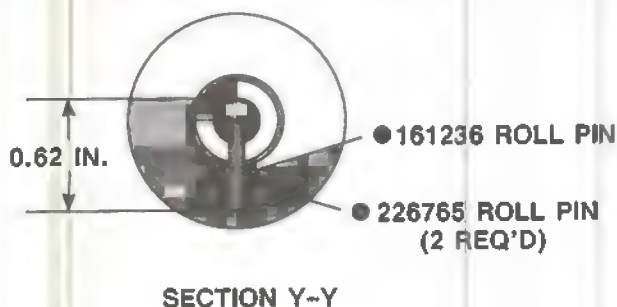
□ - INCLUDED IN FILTER ELEMENT KITS

MODEL	ELEMENT	STD.	F3
100FE/F- 1*-*-12/20	378991	941064	941065
100FE/F- 2*-*-12/20	378990	941066	941067

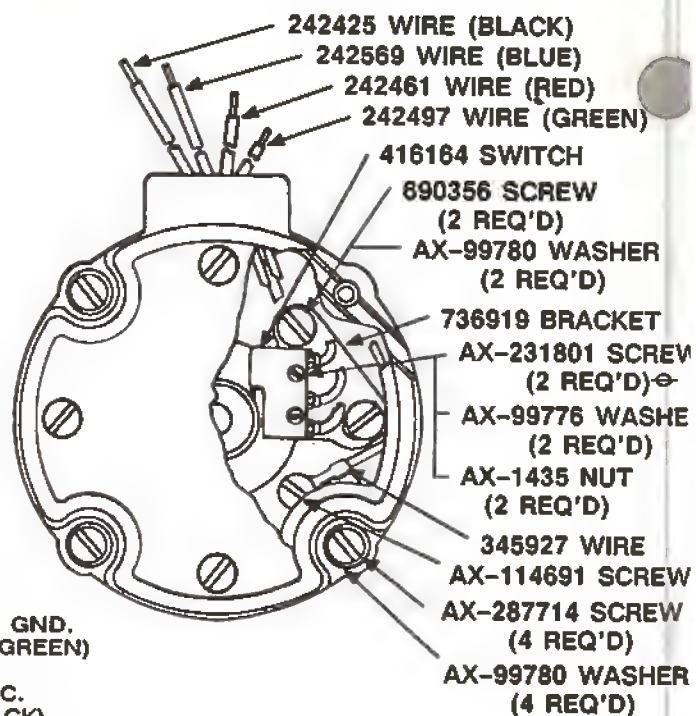
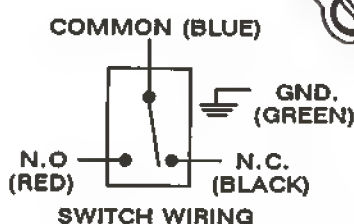
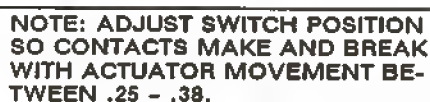
HOUSING			
PORT CONNECTION		PORT SIZE & FLOW RATING	
		'E' - 3" 97 USGPM	'F' - 3-1/2" 140 USGPM
P	STD/F3	378998	378999
	F6	390763	390764
F	STD/F3	378995	378996
	F6	390765	390766
PF	STD/F3	573013	573014
	F6	573028	573029

▲ - INCLUDED IN 919740 SEAL KIT FOR STD. & F6.
F3 EQUIVALENT 919741 SEAL KIT

● - INCLUDED IN MECHANICAL INDICATOR KIT 942477



⊖ - 100F* MODELS REQUIRE (2) AX-231084
SCREWS AND (1) 351318 INSULATOR.



(F*) - ** F * - * * - * - * - * - **

1 2 3 4 5 6 7 8 9 10

F3 - SEALS FOR MINERAL OIL &
FIRE RESISTANT FLUID

F6 - SEALS FOR OIL-IN WATER
EMULSION FLUID

(OMIT FOR STD. PETROLEUM BASED FLUID)

10, 50, 100

INLET FILTER WITH AIR BLEED

A - 1 INCH (12 GPM)
B - 1 1/2 INCH (28 GPM)
C - 2 INCH (47 GPM)
D - 2 1/2 INCH (67 GPM)
E - 3 INCH (97 GPM)
F - 3 1/2 INCH (140 GPM)

1 - 100 MESH (149 MICRON)
2 - 200 MESH (74 MICRON)

B - G1 BSPF THREAD
F - SAE FLANGE
P - NPTF THREAD
S - SAE STRAIGHT THREAD
PF - NPTF THD. (INLET PORT)
SAE FLANGE (OUTLET PORT)
SF - SAE STRAIGHT THD. (INLET PORT)
SAE FLANGE (OUTLET PORT)

E - ELECTRICAL
L - LESS INDICATOR
BLANK - MECHANICAL

3 - 3 PSI BY-PASS SPRING
BLANK - 2 PSI BY-PASS SPRING

M - MAGNET
BLANK - MAGNET OMITTED

12 - MECHANICAL OR LESS INDICATOR TYPE
20 - ELECTRICAL INDICATOR TYPE

(F*)-50F*-**-**-12/20
28, 47 & 67 GPM INLET FILTER

364152 - 2 PSI BY-PASS SPRING
364153 - 3 PSI BY-PASS SPRING

AIR BLEED TUBE
□ ELEMENT (SEE TABLE)

176035 PIN

OUTLET

HOUSING
(SEE TABLE)

INLET

PISTON	FLUID TYPE
361744	STD/F3
390762	F6

405778 PISTON STRAP

405773 BIAS SPRING

COVER	FLUID TYPE
359904	STD/F3
390761	F6

AX-99782 WASHER (4 REQ'D)

AX-1231 SCREW (4 REQ'D)
(TORQUE TO 57-67 lb. in.)

● 690357 SCREW (4 REQ'D)

361994 ROD

● 361998 INDICATOR DOME

● 361997 INDICATOR

ROLL PINS
(SEE SECTION Y-Y)

● 49072 WASHER (2 REQ'D)

● 361996 SPRING

●▲ 262330 'O'RING

□▲ 154087 'O'RING
(2 REQ'D)

□▲ 154111 'O'RING

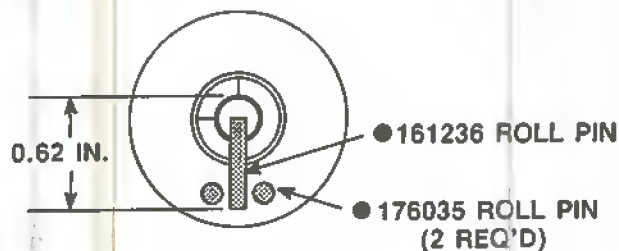
405776 CAUTION TAG
(USE ON 'P' & 'PF'
MODELS ONLY)

736852 SPRING MAGNET
(USE ON 'M' MODELS ONLY)

NOTE
INLET PORT MUST FACE DOWN-
WARD FOR AIR BLEED FEATURE
TO FUNCTION PROPERLY.

□ - INCLUDED IN FILTER ELEMENT KITS				
MODEL	ELEMENT	STD.	F3	
50FB-1*-**-12/20	361991	941056	941057	
50FB-2*-**-12/20	361740	941058	941059	
50FC/D-1*-**-12/20	361992	941060	941061	
50FC/D-2*-**-12/20	361741	941062	941063	

HOUSING				
PORT CONNECTION	PORT SIZE & FLOW RATING			
	'B' - 1-1/2" 28 USGPM	'C' - 2" 47 USGPM	'D' - 2-1/2" 67 USGPM	
P	STD/F3	361750	361751	367137
	F6	390753	390754	390755
S	STD/F3	367128	367129	—
	F6	390756	390757	—
F	STD/F3	367131	367132	367138
	F6	390758	390759	390760
PF	STD/F3	573006	573007	573008
	F6	573023	573024	573025
SF	STD/F3	573010	573011	—
	F6	573026	573027	—



SECTION Y-Y

▲ - INCLUDED IN 919643 SEAL KIT FOR STD. & F6.
F3 EQUIVALENT 919644 SEAL KIT

● - INCLUDED IN MECHANICAL INDICATOR KIT 942477

(F*)-10FA-**-**-**-12/20
12 GPM INLET FILTER

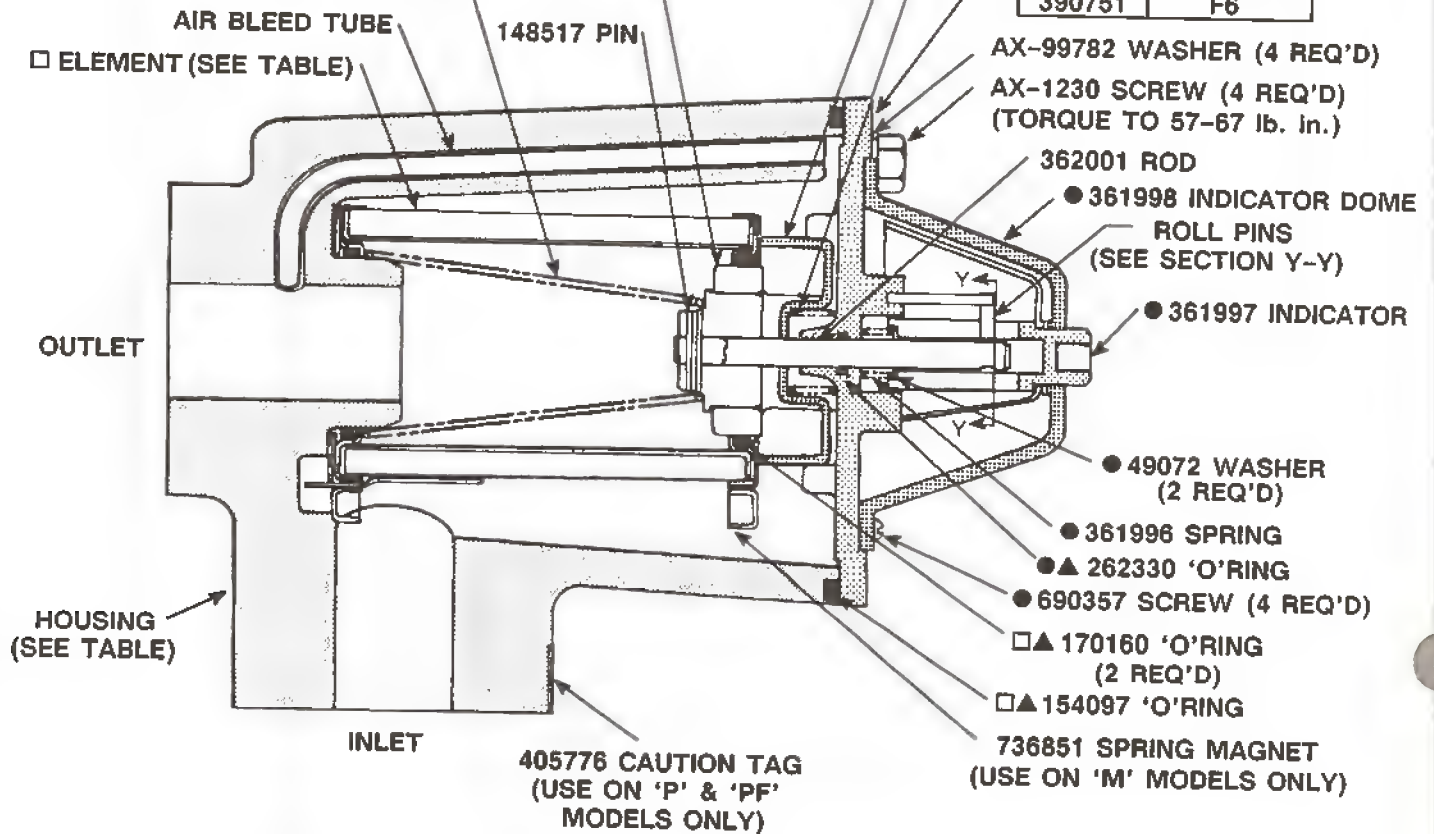
364150 - 2 PSI BY-PASS SPRING
364151 - 3 PSI BY-PASS SPRING

PISTON	FLUID TYPE
361738	STD/F3
390752	F6

405777 PISTON STRAP
405780 BIAS SPRING

COVER	FLUID TYPE
359902	STD/F3
390751	F6

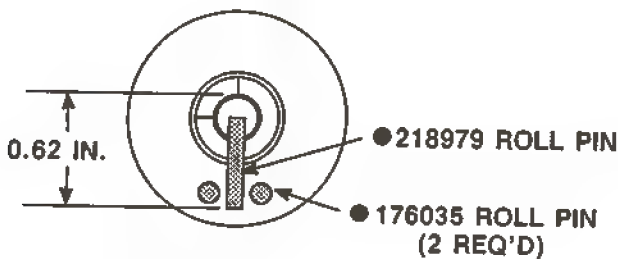
AX-99782 WASHER (4 REQ'D)
AX-1230 SCREW (4 REQ'D)
(TORQUE TO 57-67 lb. in.)



NOTE
INLET PORT MUST FACE DOWN-
WARD FOR AIR BLEED FEATURE
TO FUNCTION PROPERLY.

- INCLUDED IN FILTER ELEMENT KITS			
MODEL	ELEMENT	STD.	F3
10FA-1*-*-12/20	361990	941052	941053
10FA-2*-*-12/20	361739	941054	941055

HOUSING		
PORT CONNECTION		PORT SIZE & FLOW RATING
		'A' - 1" 12 USGPM
B	STD/F3	575965
	F6	575966
F	STD/F3	367126
	F6	390750
P	STD/F3	359906
	F6	390748
S	STD/F3	362000
	F6	390749
PF	STD/F3	573003
	F6	573021
SF	STD/F3	573004
	F6	573022



SECTION Y-Y

▲ - INCLUDED IN 919641 SEAL KIT FOR STD. & F6.
F3 EQUIVALENT 919642 SEAL KIT

● - INCLUDED IN MECHANICAL INDICATOR KIT 942477

Service Parts Information

Inlet Filters
With Air Bleed
Feature

10FA-*-*-*-12/20
50F-*-*-*-12/20
100F-*-*-*-12/20



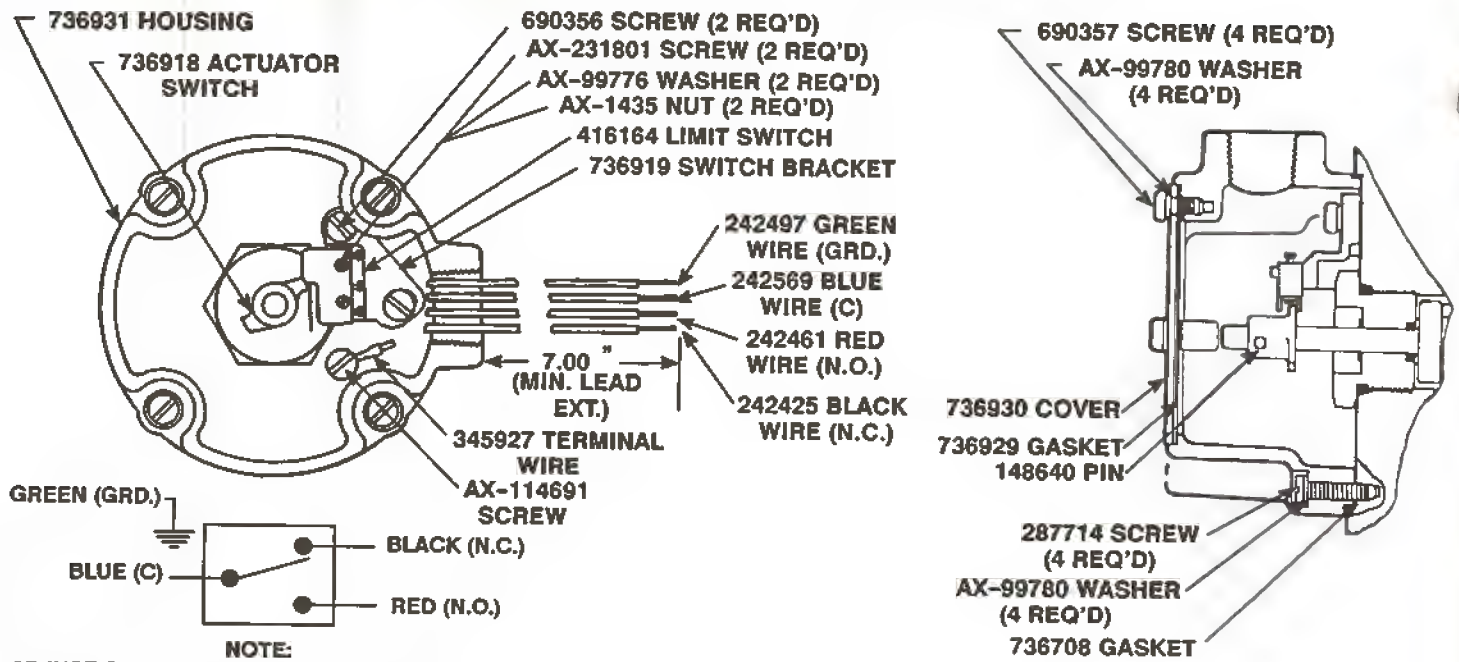
Vickers, Incorporated

P.O. Box 302
Troy, Michigan 48007-0302

Released 12-1-87

I-3961-S

ELECTRICAL INDICATOR PARTS (KIT 926586)



MODEL CODE BREAKDOWN

(F3) - OFR - * - * - (*) - (*) - (*) - 30

1 2 3 4 5 6 7 8

1 Special Seals

Seals for mineral oil & fire resistant fluids

2 Oil Filter

Return line

3 Flow Rating - USgpm

15 (Short) - 15 USgpm

30 (Long) - 30 USgpm

60 (Short) - 60 USgpm

120 (Long) - 120 USgpm

4 Port Connections

B - G1 (BSPF) thread (15 & 30 USgpm only)

F - SAE flange

P - NPTF thread

S - SAE straight thread

5 Nominal Filtration Rating

3M - 3 micrometre

7G - 7 micrometre (glass media)

7M - 7 micrometre

Blank - 10 micrometre

6 Indicator Type

E - Electrical Indicator

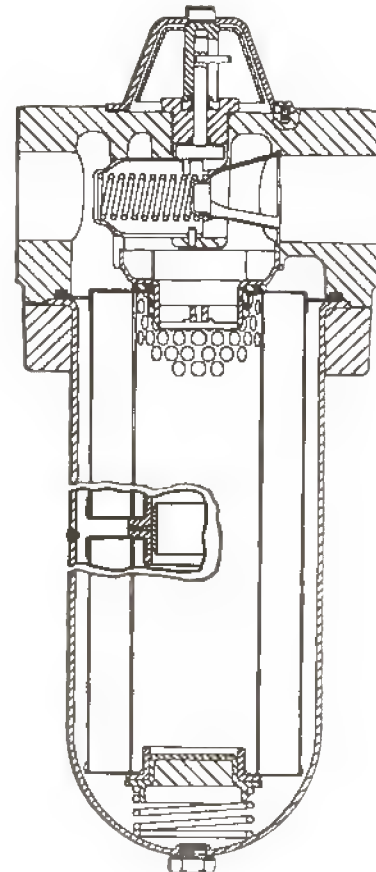
Blank - Mechanical Indicator

7 By-pass Pressure Setting

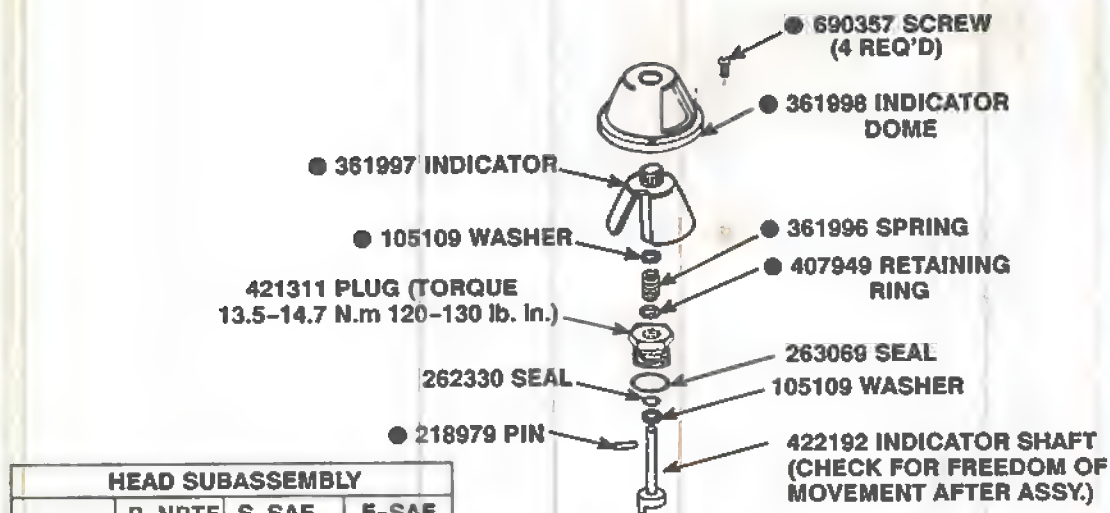
35 - 35 psi

Blank - 25 psi

8 Design



**SECTIONAL VIEW
(OFR-120 SHOWN)**

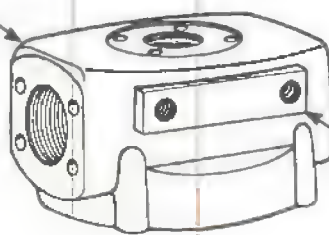


HEAD SUBASSEMBLY			
MODEL	P-NPTF THD.	S-SAE STR THD.	F-SAE FLANGE
60/120	737891	737892	737893

736140 PISTON

148640 PIN

BYPASS SPRING		
FLOW	PART	RATE
60	420606	25 PSI
120	736831	35 PSI

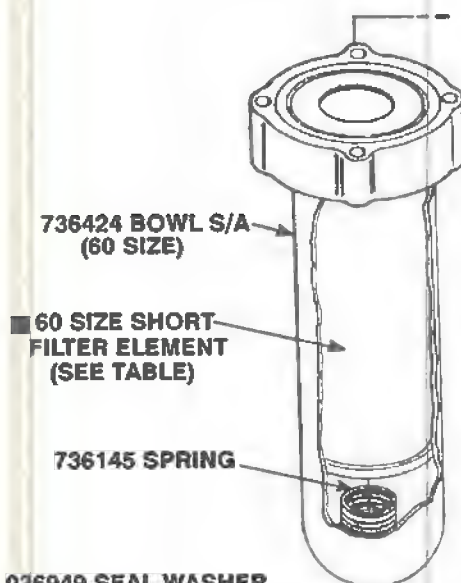


736141 SPRING RETAINER

405776 CAUTION TAG (USED ON 'P' NPTF THREAD UNITS ONLY)



■ 590021 STD. BOWL SEAL
■ 591761 F3 BOWL SEAL



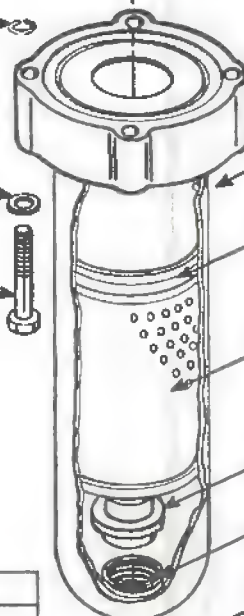
936949 SEAL WASHER

736223 DRAIN PLUG

AX-185636 SCREW RETAINER (8 REQ'D FOR EACH UNIT)

-233114 WASHER 4 REQ'D FOR EACH UNIT

AX-1297 SCREW (TO QUE 20.3-27.1 N.M 15-20 LB.FT.) (4 REQ'D F R EACH UNIT)



936949 SEAL WASHER

736223 DRAIN PLUG

NOTE
UNITS ARE MANUFACTURED WITH F3 SEALS, EXCEPT THE BOWL SEAL, WHICH IS NITRILE (STANDARD).

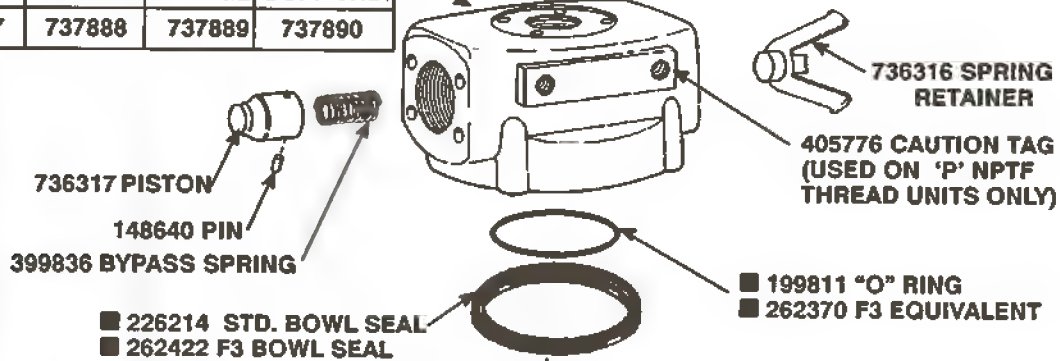
NOTE
-30 DESIGN UNITS ARE NOT INTER-CHANGEABLE WITH ANY PREVIOUS DESIGNS.

■ FILTER ELEMENT KIT			
ELEMENT TYPE	STD.	F3	
60-* -3M	737825	737829	
60-* -7G	737824	737828	
60-* -7M	737823	737827	
60-* -10	737822	737826	
120-* -3M	737833	737837	
120-* -7G	737832	737836	
120-* -7M	737831	737835	
120-* -10	737830	737834	

■ INCLUDED IN ELEMENT KIT
● INCLUDED IN MECHANICAL INDICATOR KIT 941003. SEE BACK PAGE FOR ELECTRICAL INDICATOR PARTS.

- 690357 SCREW (4 REQ'D)
- 361998 INDICATOR DOME
- 361997 INDICATOR
- 105109 WASHER
- 421311 PLUG (TORQUE 13.5-14.7 N.m 120-130 lb. in.)
- 263069 SEAL
- 262330 SEAL
- 218979 PIN
- 361996 SPRING
- 407949 RETAINING RING
- 105109 WASHER
- 422192 INDICATOR SHAFT (CHECK FOR FREEDOM OF MOVEMENT AFTER ASSY.)

HEAD SUBASSEMBLY				
MODEL	P-NPTF THD.	S-SAE STR THD	F-SAE FLANGE	B-G1 BSPF THD.
15/30	737887	737888	737889	737890



736432 BOWL S/A (15 SIZE)

■ 15 SIZE SHORT FILTER ELEMENT (SEE TABLE)

736318 SPRING

936949 SEAL WASHER

736223 DRAIN PLUG

AX-110405 SCREW RETAINER (8 REQ'D FOR EACH UNIT)

AX-233113 WASHER (4 REQ'D FOR EACH UNIT)

AX-1276 SCREW (TORQUE 20.3-27.1 N.M 15-20 LB.FT.) (4 REQ'D FOR EACH UNIT)

736433 BOWL S/A (30 SIZE)

■ 30 SIZE LONG FILTER ELEMENT (SEE TABLE)

736318 SPRING

936949 SEAL WASHER

736223 DRAIN PLUG

■ FILTER ELEMENT KIT

ELEMENT TYPE	STD.	F3
15-*-3M	737841	737845
15-*-7G	737840	737844
15-*-7M	737839	737843
15-*-10	737838	737842
30-*-3M	737849	737853
30-*-7G	737848	737852
30-*-7M	737847	737851
30-*-10	737846	737850

NOTE
UNITS ARE MANUFACTURED WITH F3 SEALS, EXCEPT THE BOWL SEAL, WHICH IS NITRILE (STANDARD).

NOTE
-30 DESIGN UNITS ARE NOT INTERCHANGEABLE WITH ANY PREVIOUS DESIGNS.

VICKERS®

A TRIMMOVA COMPANY

Service Parts Information

**LARGE RETURN
LINE FILTER**

(F3)-OFR-15-*-(*)-(*)-30

(F3)-OFR-30-*-(*)-(*)-30

(F3)-OFR-60-*-(*)-(*)-(*)-30

(F3)-OFR-120-*-(*)-(*)-(*)-30



Vickers, Incorporated

P.O. Box 302
Troy, Michigan
48007-0302

Released 9-1-89

I-3964-S



Service Parts Information

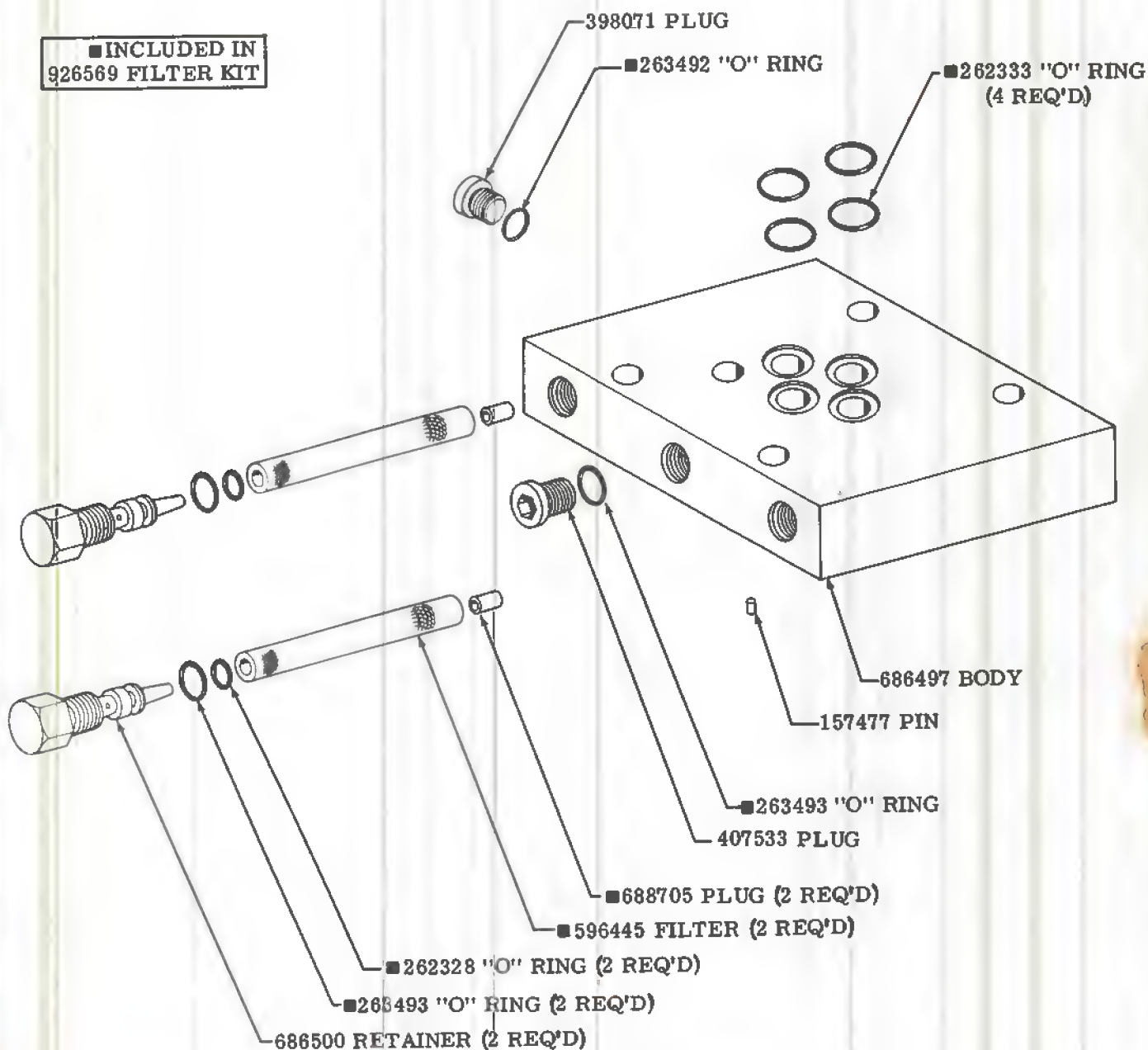
VICKERS

A TRIMMOVA COMPANY

**DUAL
FILTER
MODULE**

SM4FM-20/30-10

■ INCLUDED IN
926569 FILTER KIT

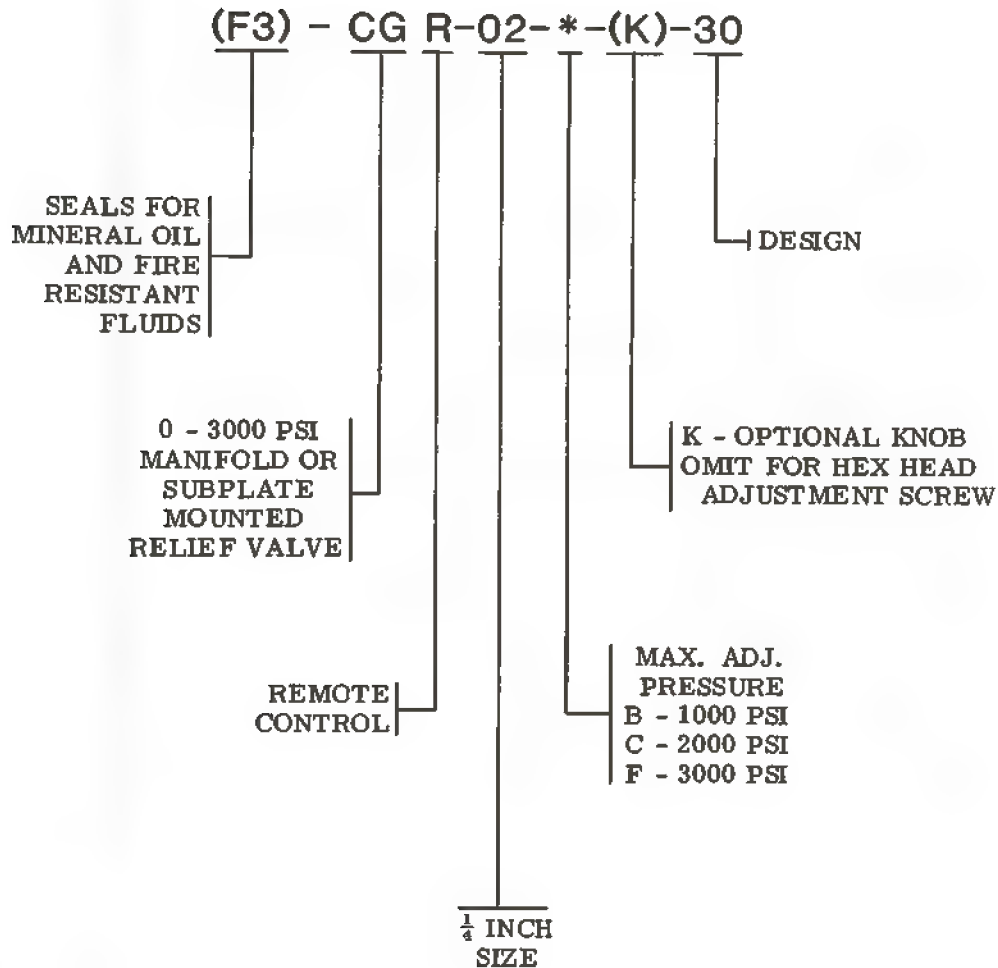


Vickers, Incorporated
P.O. Box 302
Troy, Michigan 48007-0302

Released 10-1-86

I-3051-S

MODEL CODE BREAKDOWN



For satisfactory service life of these components in industrial applications, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from Vickers OFP, OFR, and OFRS series are recommended.

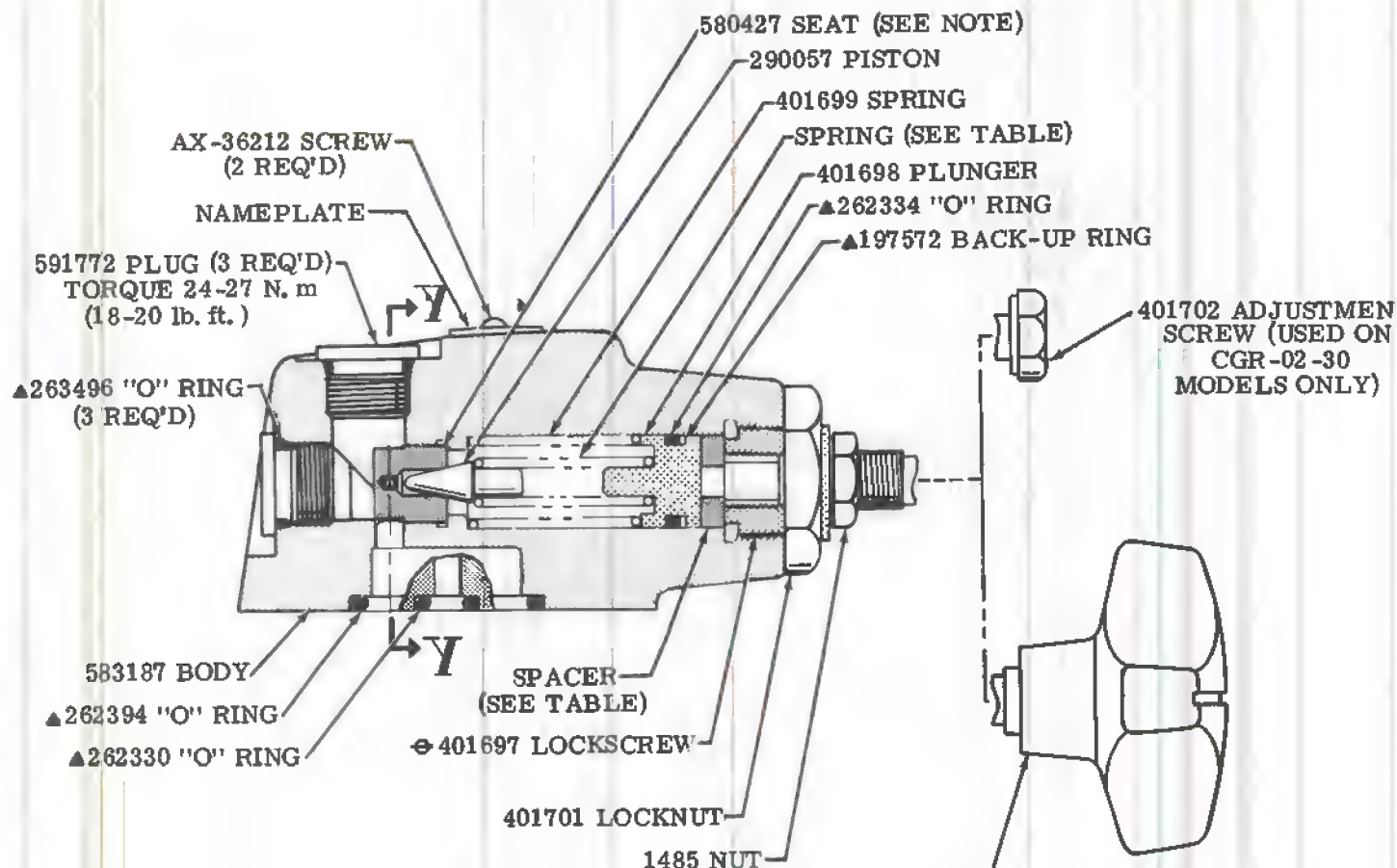
Service Parts Information

VICKERS

A TRIMONA COMPANY

REMOTE CONTROL RELIEF VALVES

(F3)CGR-02-*(K)-30



MODEL	MAX. ADJ. PRESSURE	SPRING	SPACER
CGR-02-B-(K)-30	1000 PSI	2280	—
CGR-02-C-(K)-30	2000 PSI	583937	—
CGR-02-F-(K)-30	3000 PSI	401700	386715

NOTE
ASSEMBLE 580427 SEAT WITH CROSS HOLE
IN POSITION SHOWN OR 180° FROM POSI-
TION SHOWN.

⊕INSTALL LOCKSCREW WITH
STEPPED O.D. END TOWARD
SPACER OR PLUNGER AS
SHOWN.

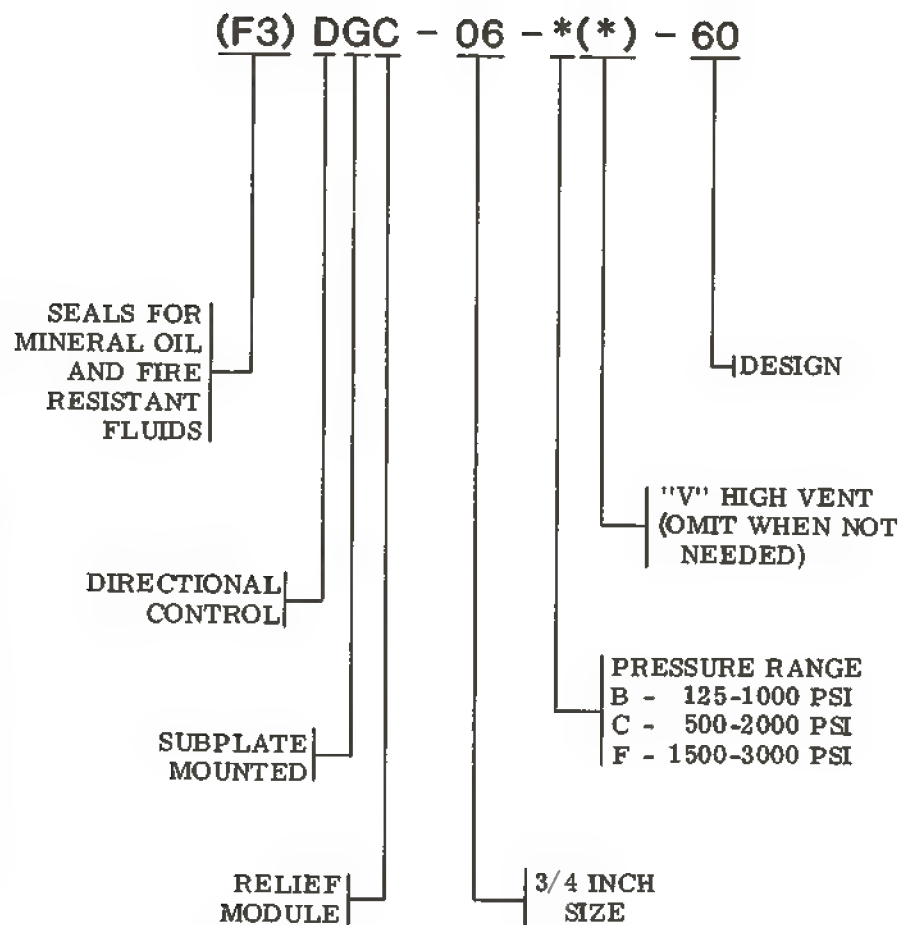
▲SERVICE ALL UNITS
W/F3 SEAL KIT 919854

Vickers, Incorporated
P.O. Box 302
Troy, Michigan 48007-0302

Revised 8-1-85

I-3678-S

MODEL CODE BREAKDOWN



To insure sustained efficiency and maximum trouble free life of this precision equipment, initial and continuous full flow filtration of the fluid medium is essential. Select and apply filters from the Vickers OFP, OFR, and OFRS series, which are available in 3, 10, and 25 micrometre filtration ratings.

Litho in U. S. A.

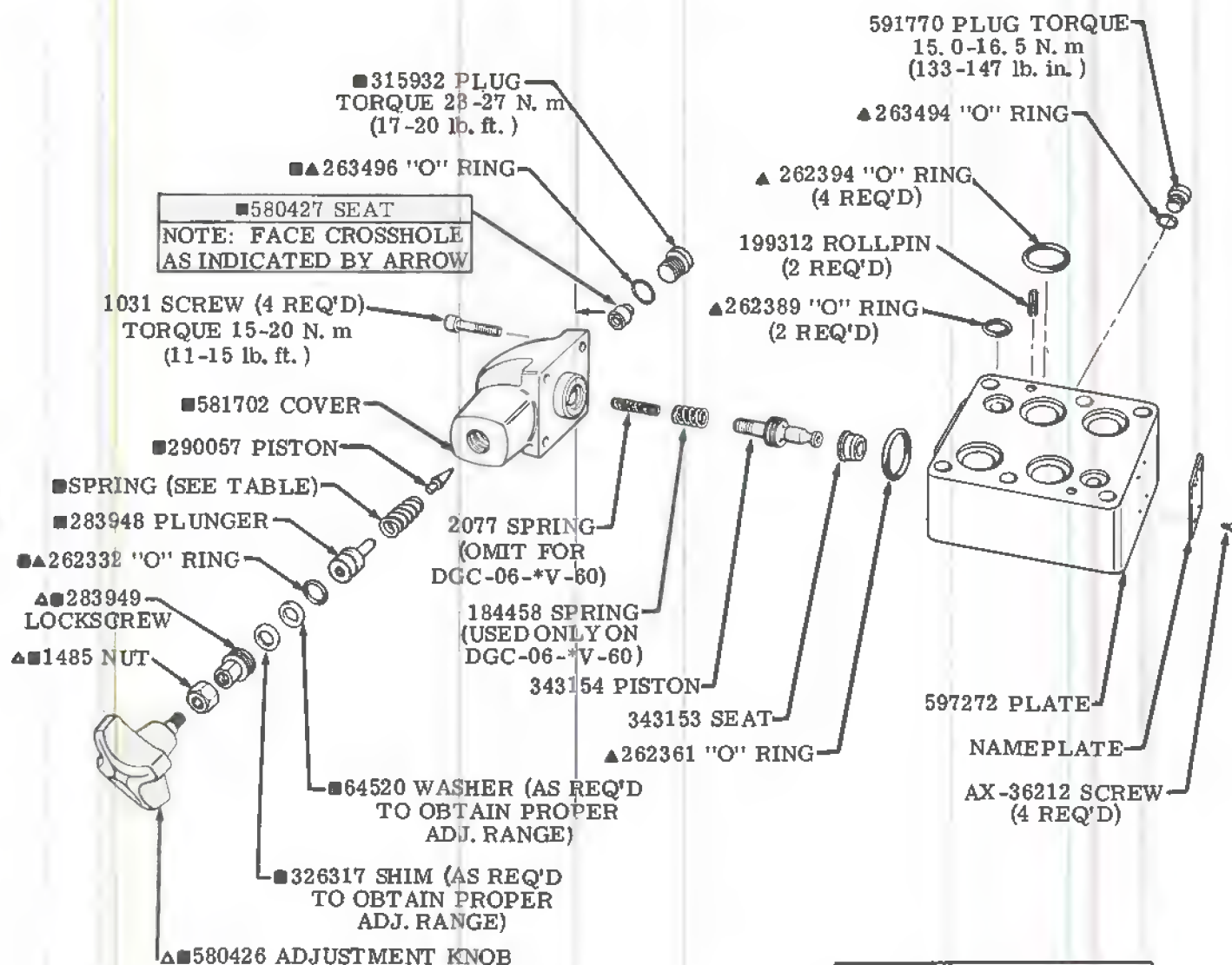
Service Parts Information

MODULAR RELIEF VALVES

(F3)DGC-06-*(*)-60

VICKERS

A TRIMONA COMPANY



CAUTION
THIS MODEL CANNOT BE
USED WITH PRESSURE
CENTERED (D) VALVES.

▲SERVICE ALL UNITS
W/F3 SEAL KIT 919655

▲COAT WITH
OIL PRIOR
TO ASSEMBLY

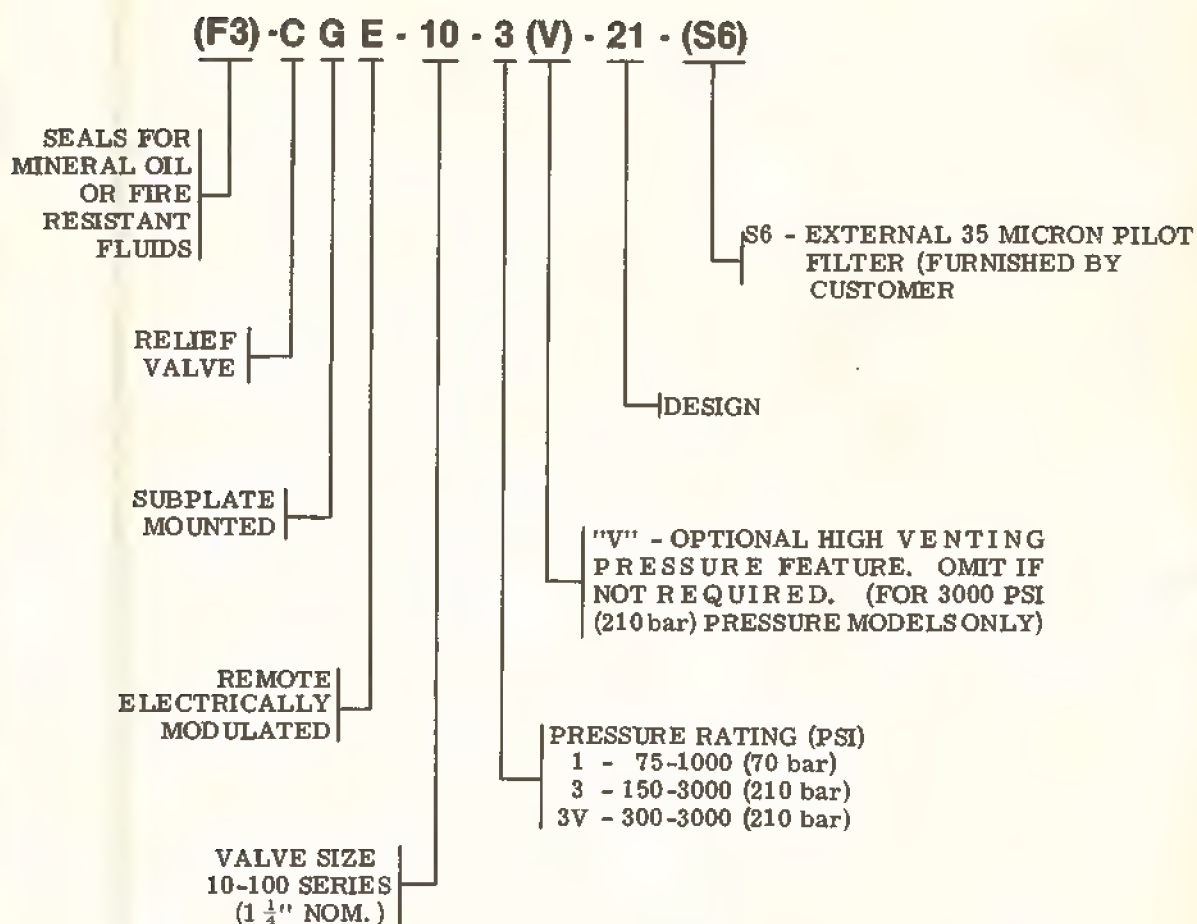
MODEL	■INCLUDED IN COVER S/A	■SPRING
DGC-06-B*-60	941280	2280
DGC-06-C*-60	941281	583937
DGC-06-F*-60	941282	2281

Vickers, Incorporated
P.O. Box 302
Troy, Michigan 48007-0302

Revised I-I-85

I-3677-S

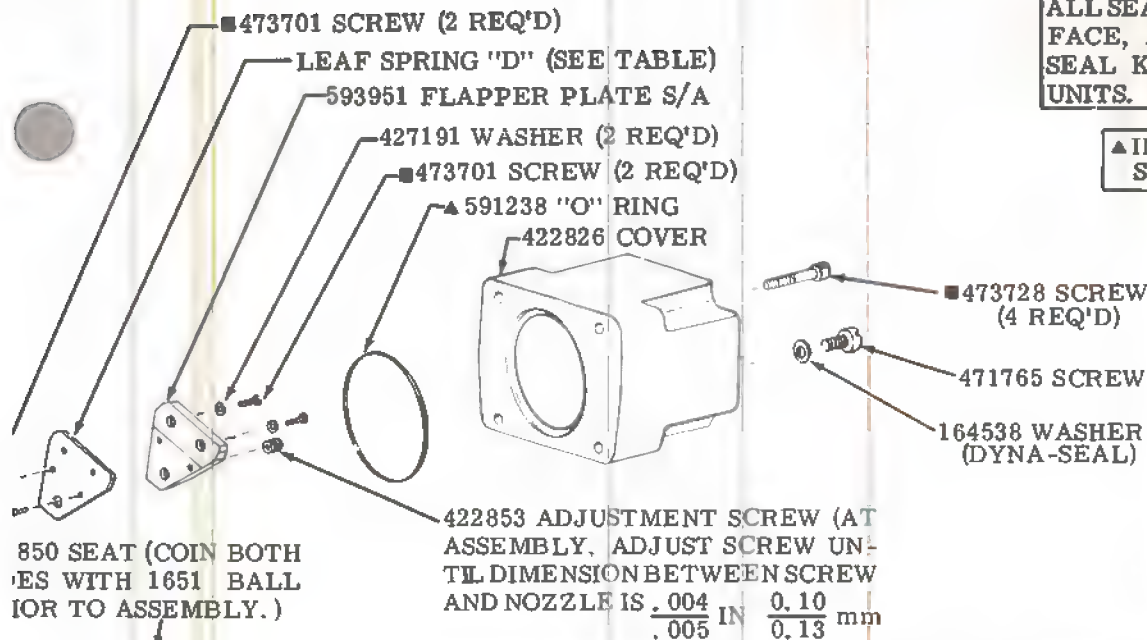
MODEL CODE BREAKDOWN



For satisfactory service life of these components, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from Vickers OFP, OFR, and OFRS series are recommended.

ALL SEALS, EXCEPT INTER-FACE, ARE F3. USE THE F3 SEAL KIT TO SERVICE ALL UNITS.

▲ INCLUDED IN F3 SEAL KIT 920082



◆ NOT AVAILABLE FOR SALE

MODEL	◆ BODY	▲ "O" RING	■ PLUG	EXTERNAL 3000 PSI 35 MICRON FILTER REQ'D
CGE-10-**-21	597719	—	—	NO
CGE-10-**-21-S6	597832	263494	343740	YES

*NUMBER OF SHIMS ARE FACTORY SELECTED TO OBTAIN MAXIMUM PRESSURE SETTING.

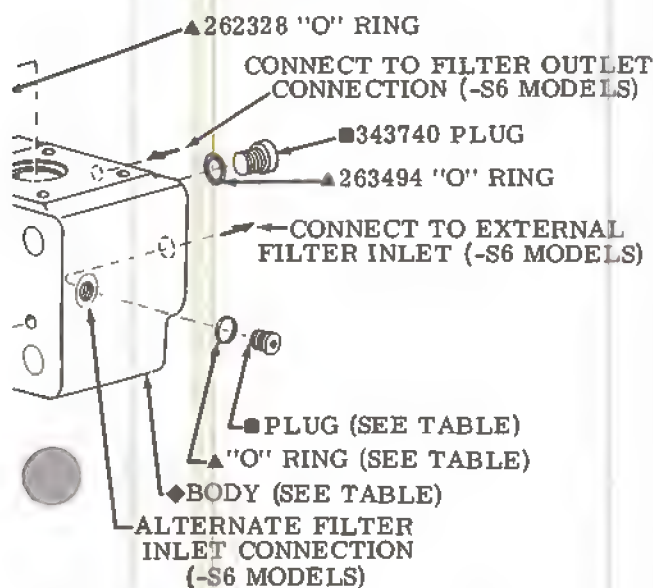
424189 NOZZLE (TORQUE TO 11 - 13 lb. in.) (1.2 - 1.5 N. m)
422842 NOZZLE (TORQUE TO 13 - 15 lb. in.) (1.5 - 1.7 N. m)

MODEL	PRESS. RANGE	SPRING "A"	SPRING "B"	LEAF SPRING "D"	NOZZLE "E"	SHIM "F"	DAMPING SHIM "G"
CGE-10-1-21	75 TO 1000 PSI	2280	424202	424188	424189	424190	424724
CGE-10-3-21	150 TO 3000 PSI	2281	424731	422835	422842	422839	—
CGE-10-3V-21	300 TO 3000 PSI	2281	291821	422835	422842	422839	—

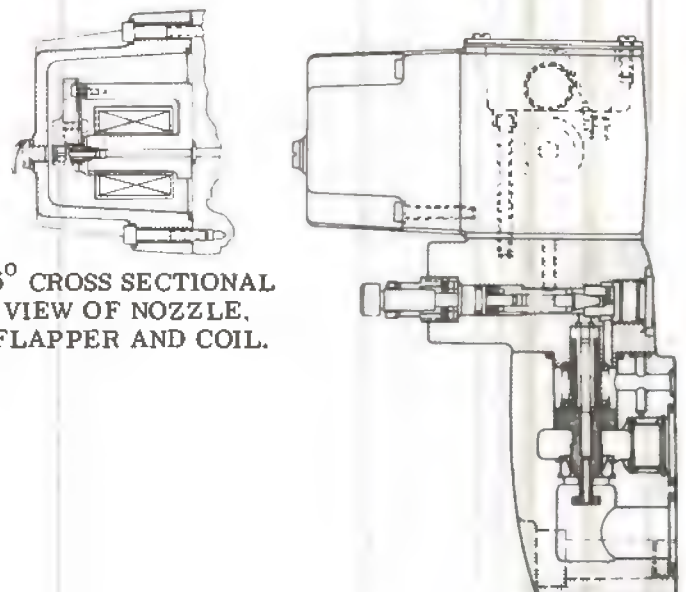
0 WASHERS (A/R FOR PRESSURE ADJ. RANGE)

292230 ADJUSTING SCREW
1485 NUT LOCKSCREW

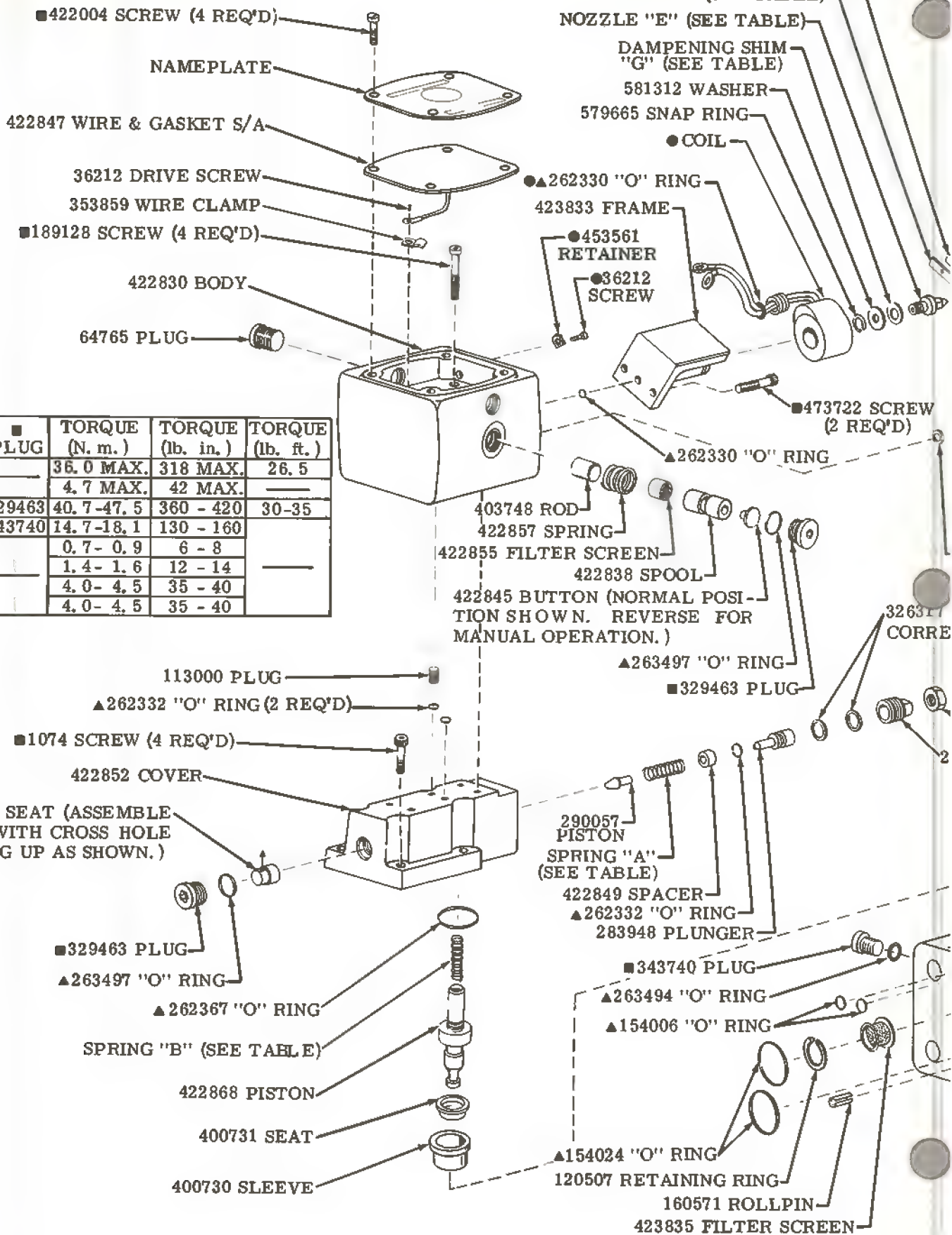
COAT WITH OIL PRIOR TO ASSEMBLY



45° CROSS SECTIONAL VIEW OF NOZZLE, FLAPPER AND COIL.



● INCLUDED IN
926275 COIL KIT



SCREW	PLUG	TORQUE (N. m.)	TORQUE (lb. in.)	TORQUE (lb. ft.)
1074		36.0 MAX.	318 MAX.	26.5
189128		4.7 MAX.	42 MAX.	
	329463	40.7-47.5	360 - 420	30-35
	343740	14.7-18.1	130 - 160	
422004		0.7 - 0.9	6 - 8	
473701		1.4 - 1.6	12 - 14	
473722		4.0 - 4.5	35 - 40	
473728		4.0 - 4.5	35 - 40	

Service Parts Information

**Remote
Electrically
Modulated
Relief Valve**

CGE-10-1-21-(S6)
CGE-10-3(V)-21-(S6)



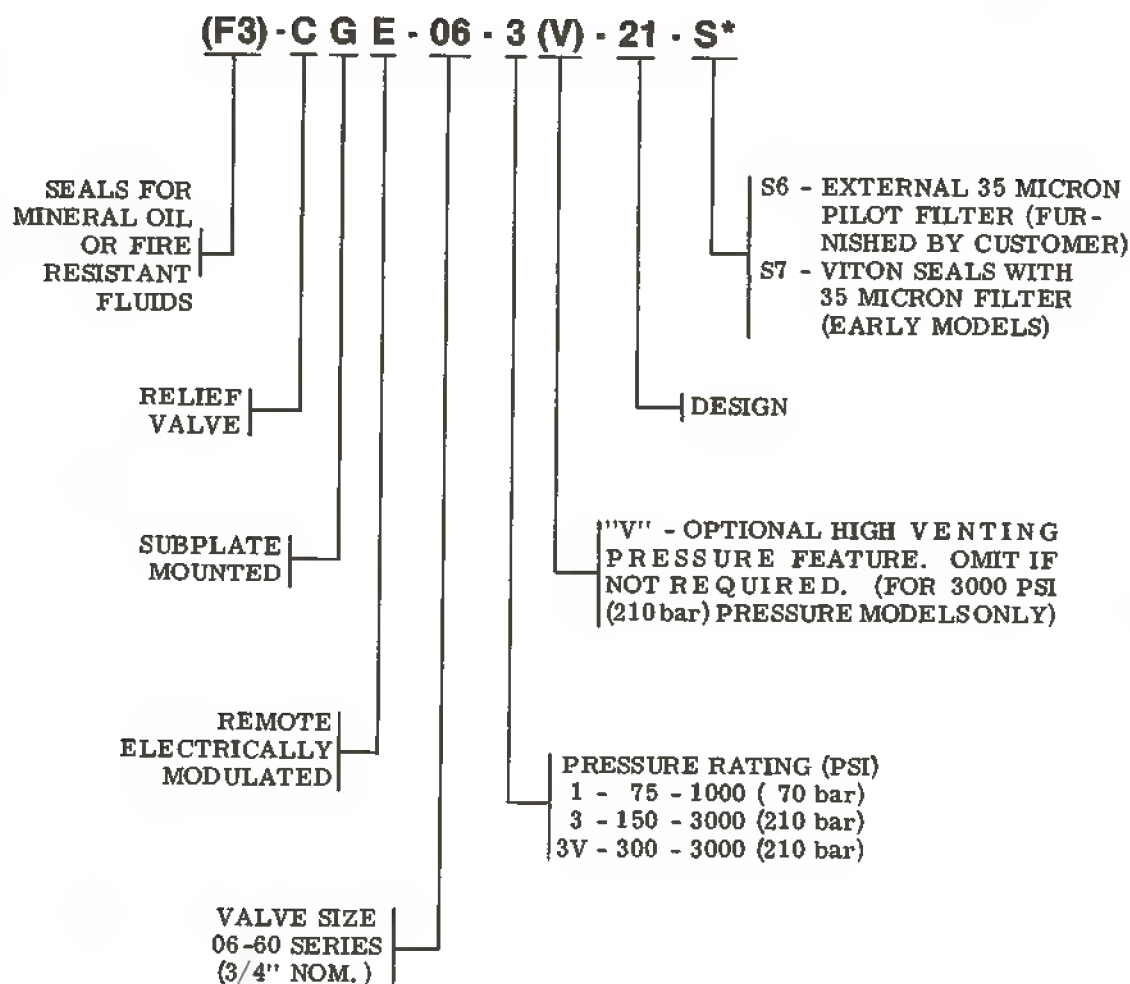
Vickers, Incorporated

1401 Crooks Road
Troy, Michigan 48064

Revised 12-1-87

I-3676-S

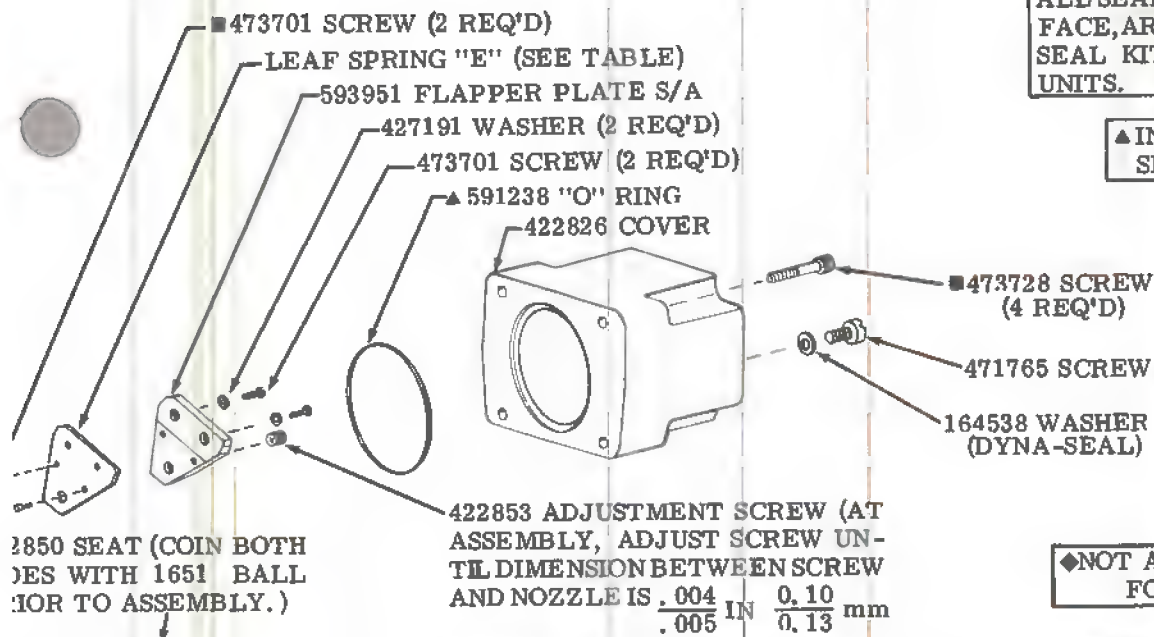
MODEL CODE BREAKDOWN



For satisfactory service life of these components, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from Vickers OFP, OFR, and OFRS series are recommended.

ALL SEALS, EXCEPT INTER-FACE, ARE F3. USE THE F3 SEAL KIT TO SERVICE ALL UNITS.

▲ INCLUDED IN F3 SEAL KIT 920081



◆ NOT AVAILABLE FOR SALE

MODEL	◆ BODY	▲ "O" RING	■ PLUG	EXTERNAL 3000 PSI 35 MICRON FILTER REQ'D
CGE-06-**-21	597718	—	—	NO
CGE-06-**-21-S6	597831	263494	343740	YES

*NUMBER OF SHIMS ARE FACTORY SELECTED TO OBTAIN MAXIMUM PRESSURE SETTING.

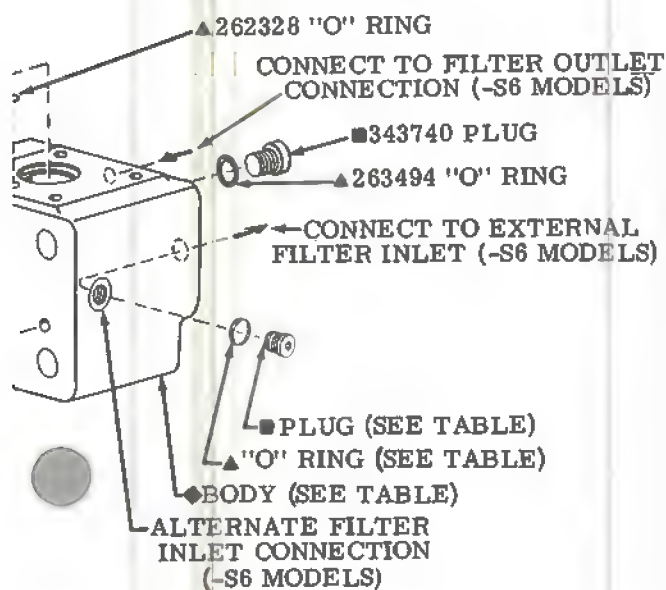
424189 NOZZLE (TORQUE TO 11 - 13 lb. in.) (1.2 - 1.5 N. m)
422842 NOZZLE (TORQUE TO 13 - 15 lb. in.) (1.5 - 1.7 N. m)

20 WASHERS (A/R FOR PRESSURE ADJ. RANGE)

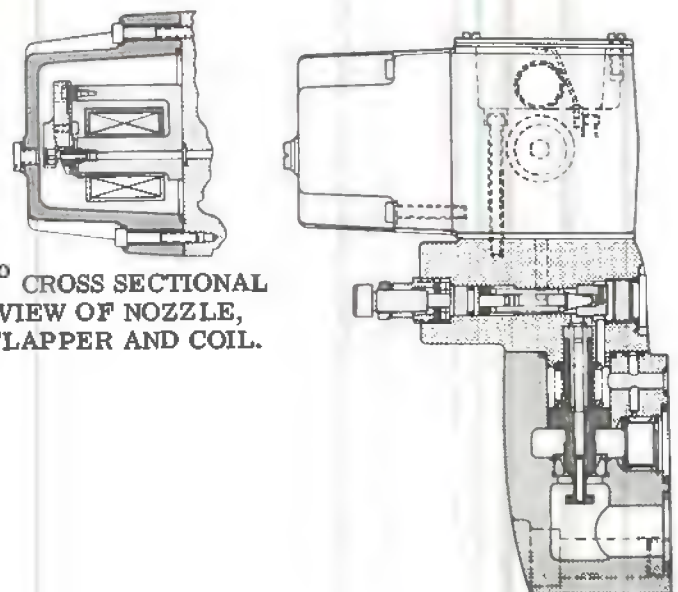
292230 ADJUSTING SCREW
1485 NUT LOCKSCREW

MODEL	PRESS. RANGE	SPRING "A"	SPRING "B"	SPRING "C"	LEAF SPRING "E"	NOZZLE "F"	SHIM "G"	DAMPING SHIM "H"
CGE-06-1-21	75 TO 1000 PSI	2280	2077	—	424188	424189	424190	424724
CGE-06-3-21	150 TO 3000 PSI	2281	2077	—	422835	422842	422839	—
CGE-06-3V-21	300 TO 3000 PSI	2281	—	184458	422835	422842	422839	—

COAT WITH OIL PRIOR TO ASSEMBLY



45° CROSS SECTIONAL VIEW OF NOZZLE, FLAPPER AND COIL.



●INCLUDED IN
COIL KIT 926275

■422004 SCREW (4 REQ'D)

NAMEPLATE

422847 WIRE & GASKET S/A

36212 DRIVE SCREW

353859 WIRE CLAMP

■189128 SCREW (4 REQ'D)

422830 BODY

64765 PLUG

*422861 SHIMS
SHIM "G" (SEE TABLE)

NOZZLE "F" (SEE TABLE)

DAMPENING SHIM
"H" (SEE TABLE)

581312 WASHER

579665 SNAP RING

●COIL

●▲262330 "O" RING

423833 FRAME

●36212 SCREW

●453561
RETAINER

■473722 SCREW
(2 REQ'D)

▲262330 "O" RING

403748 ROD

422857 SPRING

422855 FILTER SCREEN

422838 SPOOL

422845 BUTTON (NORMAL POSI-
TION SHOWN. REVERSE FOR
MANUAL OPERATION.)

▲263497 "O" RING

■329463 PLUG

326317
CORR

113000 PLUG

▲262332 "O" RING (2 REQ'D)

■1031 SCREW (4 REQ'D)

422828 COVER

285601 SEAT (ASSEMBLE
SEAT WITH CROSS HOLE
FACING UP AS SHOWN.)

290057
PISTON
SPRING "A"
(SEE TABLE)

422849 SPACER

▲262332 "O" RING

283948 PLUNGER

■329463 PLUG

▲263497 "O" RING

▲262361 "O" RING

SPRING "B" (SEE TABLE)

SPRING "C" (SEE TABLE)

422859 PISTON

343153 SEAT

■343740 PLUG

▲263494 "O" RING

▲154006 "O" RING

▲154020 "O" RING

103989 RETAINING RING

160571 ROLL PIN

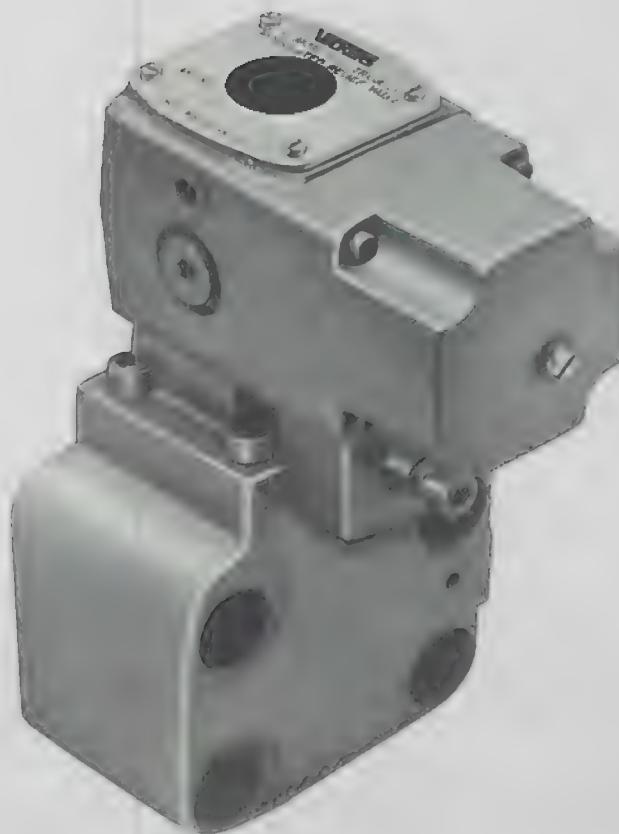
422856 FILTER SCREEN

■ SCREW	■ PLUG	TORQUE (N. m.)	TORQUE (lb. in.)	TORQUE (lb. ft.)
1031	—	12.6 MAX.	112 MAX.	—
189128	—	4.7 MAX.	42 MAX.	—
—	329463	40.7-47.5	360-420	30-35
—	343740	14.7-18.1	130-160	—
422004	—	0.7-0.9	6-8	—
473701	—	1.4-1.6	12-14	—
473722	—	4.0-4.5	35-40	—
473728	—	4.0-4.5	35-40	—

S r n

**Remote
Electrically
Modulated
Relief Valves**

CGE-06-1-21
CGE-06-3(V)-21-(S6)(S7)



Vickers, Incorporated

P.O. Box 302
Troy, Michigan 48007-0302

Revised 12-1-87

I-3675-S

MODEL CODE BREAKDOWN

(F3)-CG-(H)-*(V)-(P)(*)DG(L)-8C-(H)-(*)-20**

SEALS FOR MINERAL
OIL AND FIRE
RESISTANT FLUIDS

RELIEF VALVE

MANIFOLD OR
SUBPLATE
MOUNTED

HIGH FLOW

NOMINAL SIZE
06 - 3/4"
10 - 1 1/4"

PRESSURE RANGE PSI
(FOR HEAD #1, #2, & #3)
B - 125 - 1000 PSI
C - 500 - 2000 PSI
F - 1500 - 3000 PSI
E - VENT

V - HIGH VENT SPRING
OMIT - LOW VENT SPRING

P - INSTA PLUG FEATURE
OMIT - NOT REQUIRED

A - WITH PLUG ONLY
B - WITH PLUG AND
RECEPTACLE
OMIT - NOT REQUIRED

DESIGN

SOLENOID VOLTAGE
(OMIT FOR STD.
115AC60)

H - OIL IMMERSED
SOLENOID
OMIT - STANDARD
SOLENOID

C - SPRING
CENTERED
PILOT

8 - TANDEM
OPEN
CENTER
CROSSOVER
SPOOL

L - SOLENOID INDICATOR
LIGHTS
OMIT - WITHOUT LIGHTS

MANIFOLD OR
SUBPLATE
MOUNTED

DIRECTIONAL
VALVE
PILOT
STAGE

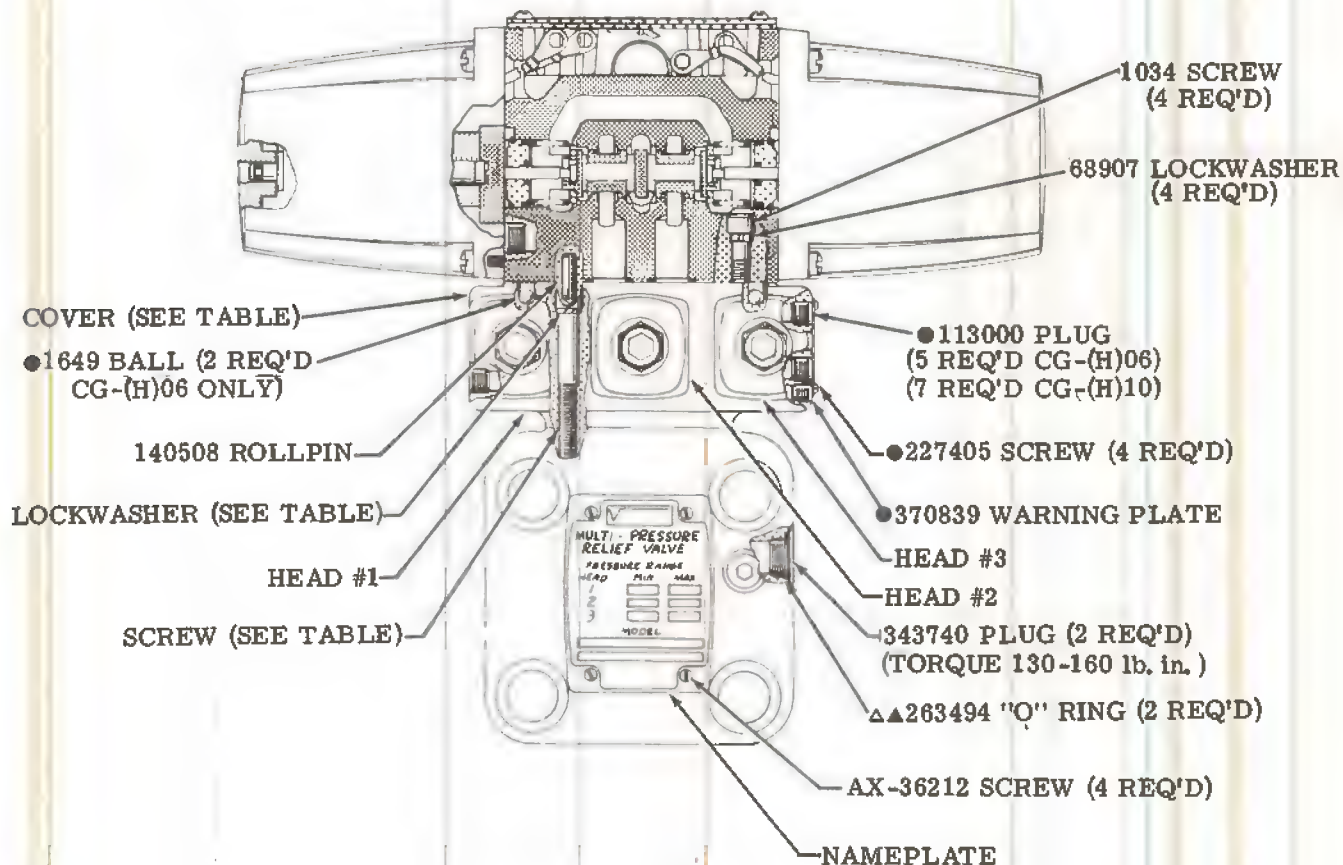
For satisfactory service life of these components, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from OFF, OFR and OFRS filter series are recommended.

INSTA-PLUG CONNECTORS FOR
DG4S4 PILOT STAGE ARE SHOWN
ON DRAWING I-3487-S.

OIL IMMERSED SOLENOID
INFORMATION IS SHOWN
ON DRAWING I-3498-S.

WARNING
DO NOT USE OTHER THAN A DG4S4-018C-* -50
DIRECTIONAL VALVE AS THE PILOT FOR THIS
RELIEF VALVE. USE OF A DIFFERENT PILOT
CAN BLOCK THE RELIEF VALVE CAUSING EX-
CESSIVE SYSTEM PRESSURE.

DG4S4-018C-* -50 PILOT VALVE
(REFER TO I-3477-S FOR PARTS
INFORMATION)

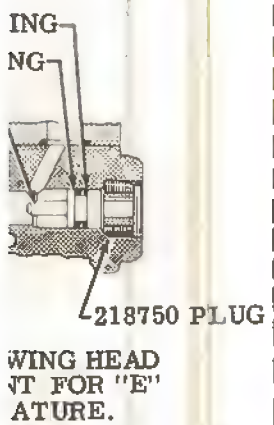


MODEL	SCREW (4 REQ'D)	LOCKWASHER (4 REQ'D)
CG-(H)06	1036	68907
CG-(H)10	1076	68909

ALL SEALS, EXCEPT DIRECTIONAL VALVE &
RELIEF VALVE INTERFACE SEALS, ARE F3.
USE F3 SEAL KIT TO SERVICE ALL UNITS.

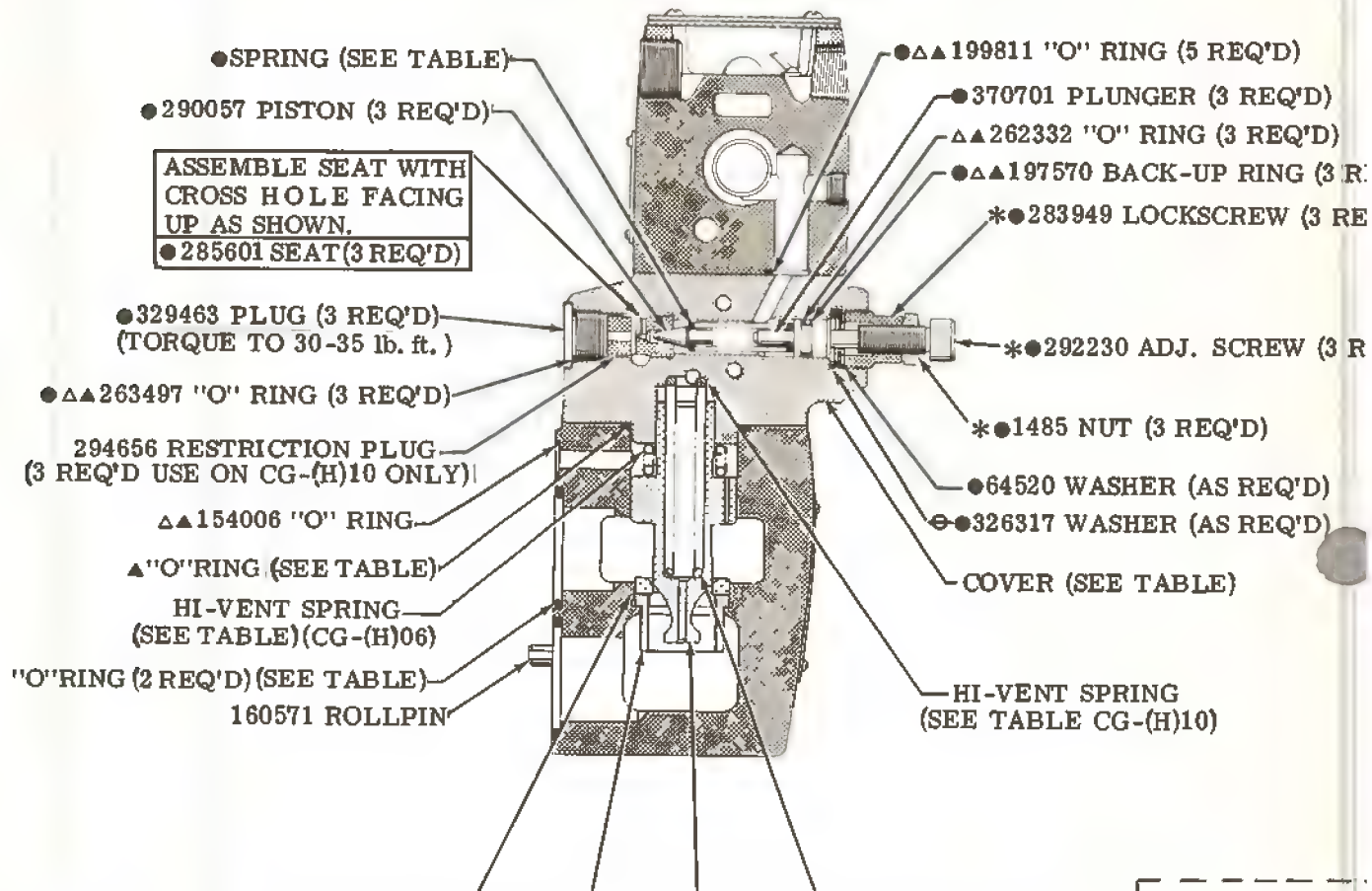
▲ INCLUDED IN
(F3)CG-(H)06
SEAL KIT 919684

▲ INCLUDED IN
(F3)CG-(H)10
SEAL KIT 919685



MODEL	HEAD #1		HEAD #2		HEAD #3		●CG-(H)06 COVER S/A
	● SPRING	PRESSURE RANGE PSI	● SPRING	PRESSURE RANGE PSI	● SPRING	PRESSURE RANGE PSI	
CG-(H)06/(H)10-CBF			2280	125 - 1000	2281	1500 - 3000	942198
CG-(H)06/(H)10-CEB	583937	500 - 2000	VENT	—	2280	125 - 1000	—
CG-(H)06/(H)10-CBC			2280	125 - 1000	583937	500 - 2000	942202
CG-(H)06/(H)10-FFB	2281	1500 - 3000	2281	1500 - 3000	2280	125 - 1000	942326

●IN
COVE



MODEL	"O" RING	"O" RING (2 REQ'D)	BODY	SEAT	SLEEVE	HYDRO CONE	LO-VENT SPRING	HI-VENT SPRING	● COVER
CG-06				343153	—				
CG-H06	● ▲ 262361	▲ 154020	580456	589473	589472	343154	2077	184458	370664
CG-10	● ▲ 262367	▲ 154024	581703	283954	—				
CG-H10				587996	400730	283952	291822	291821	370669

THIS PART USED AT FINAL
TEST TO OBTAIN CORRECT
PRESSURE RANGE.

USE EITHER A LO-VENT OR
HI-VENT SPRING AS SHOWN.
DO NOT USE BOTH.

*NOTE
COAT 292230 ADJ. SCREW, 283949
LOCK SCREW, AND 1485 LOCKNUT
WITH OIL PRIOR TO ASSEMBLY.

▲▲ 197570 BACK-
▲▲ 262332 "O"
370701 PLUNG

329463 PLUG
(REF.)

SECTION
ARRANGI
VEN



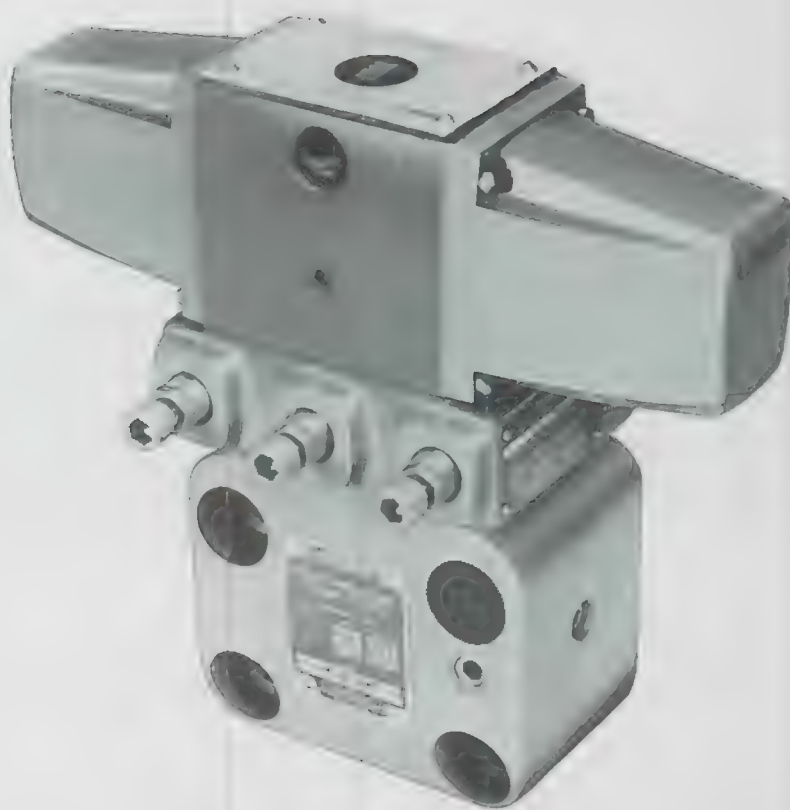
A TRIMONA COMPANY

Service Parts Information

**Multi-Pressure
Relief Valves**

CG-(H)-06-* (V)-(P)(*)DG(L)-8C-(H)-(*)-20

CG-(H)-10-* (V)-(P)(*)DG(L)-8C-(H)-(*)-20



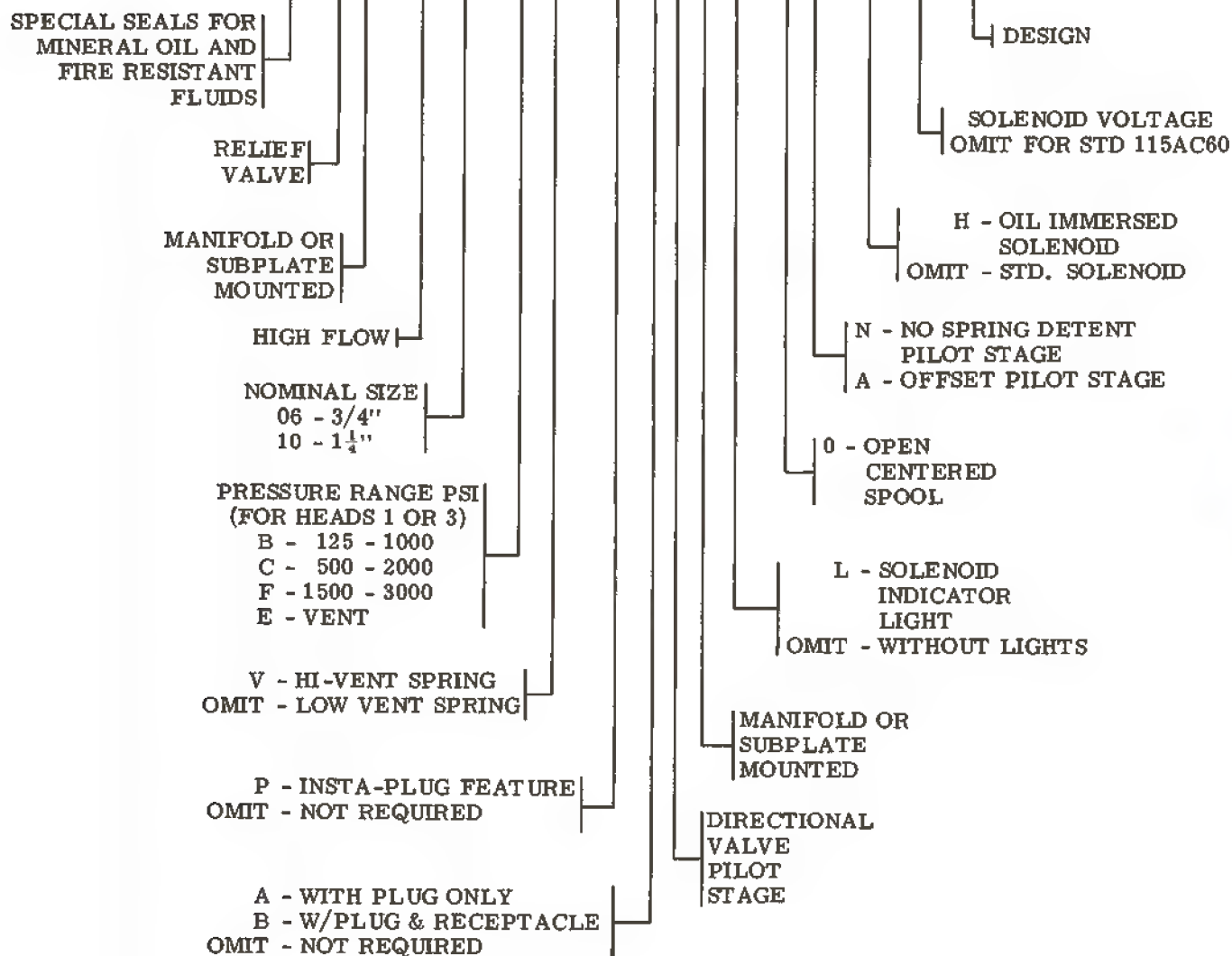
Vickers, Incorporated

1401 Crooks Road
Troy, Michigan 48084

Revised 12-1-87

I-3684-S

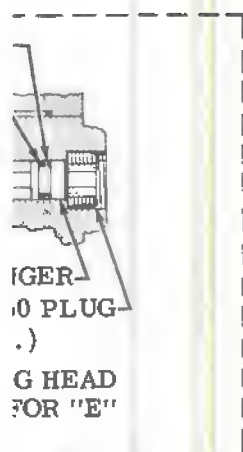
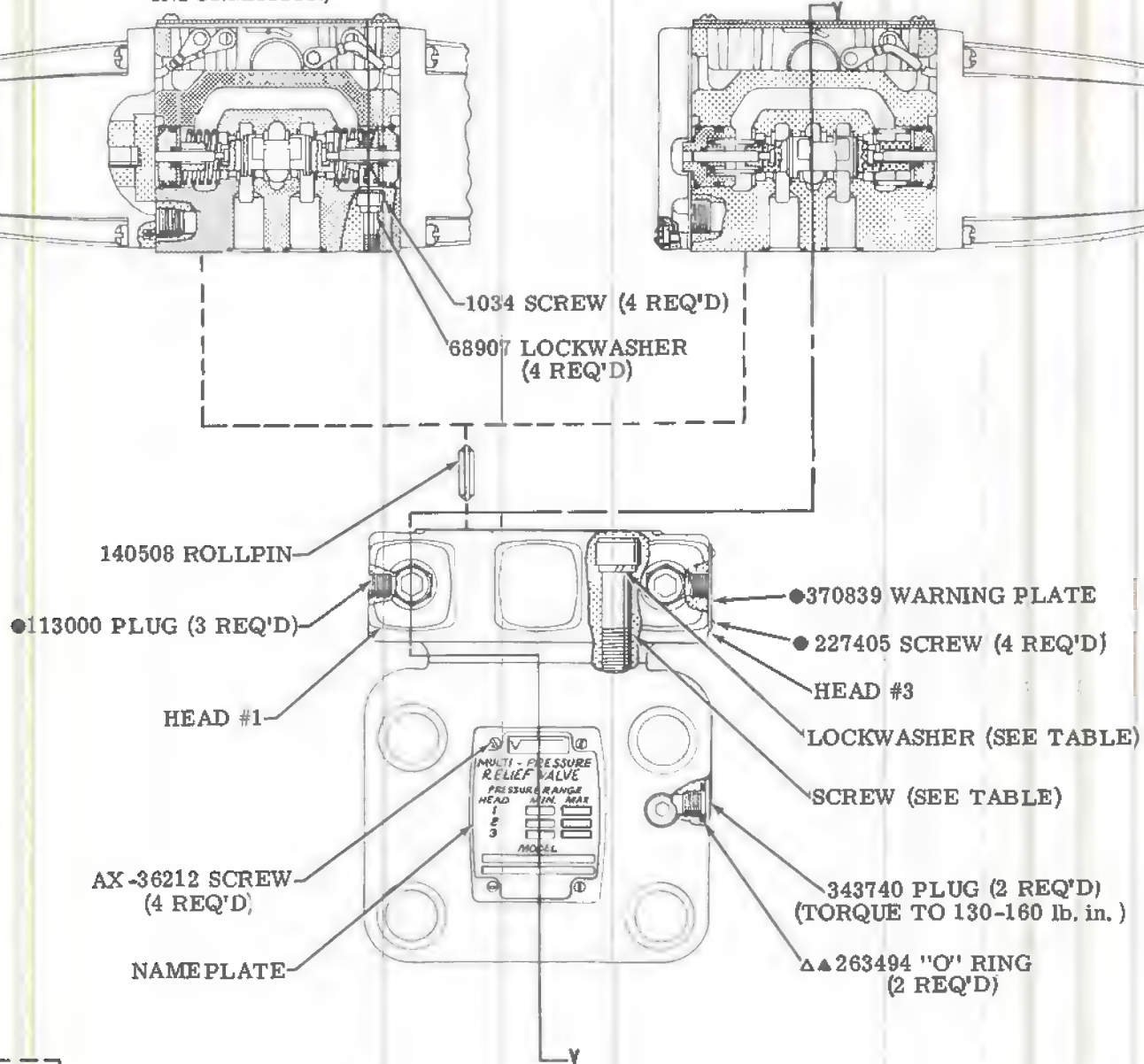
(F3)CG-(H)-* (V)-(P)*DG(L)-O*-(H)-*-20**



Litho in U. S. A.

DG4S4-010N-*-51 PILOT VALVE
(REFER TO I-3471-S FOR PARTS
INFORMATION)

DG4S4-010A-*-50 PILOT VALVE
(REFER TO I-3478-S FOR PARTS
INFORMATION)



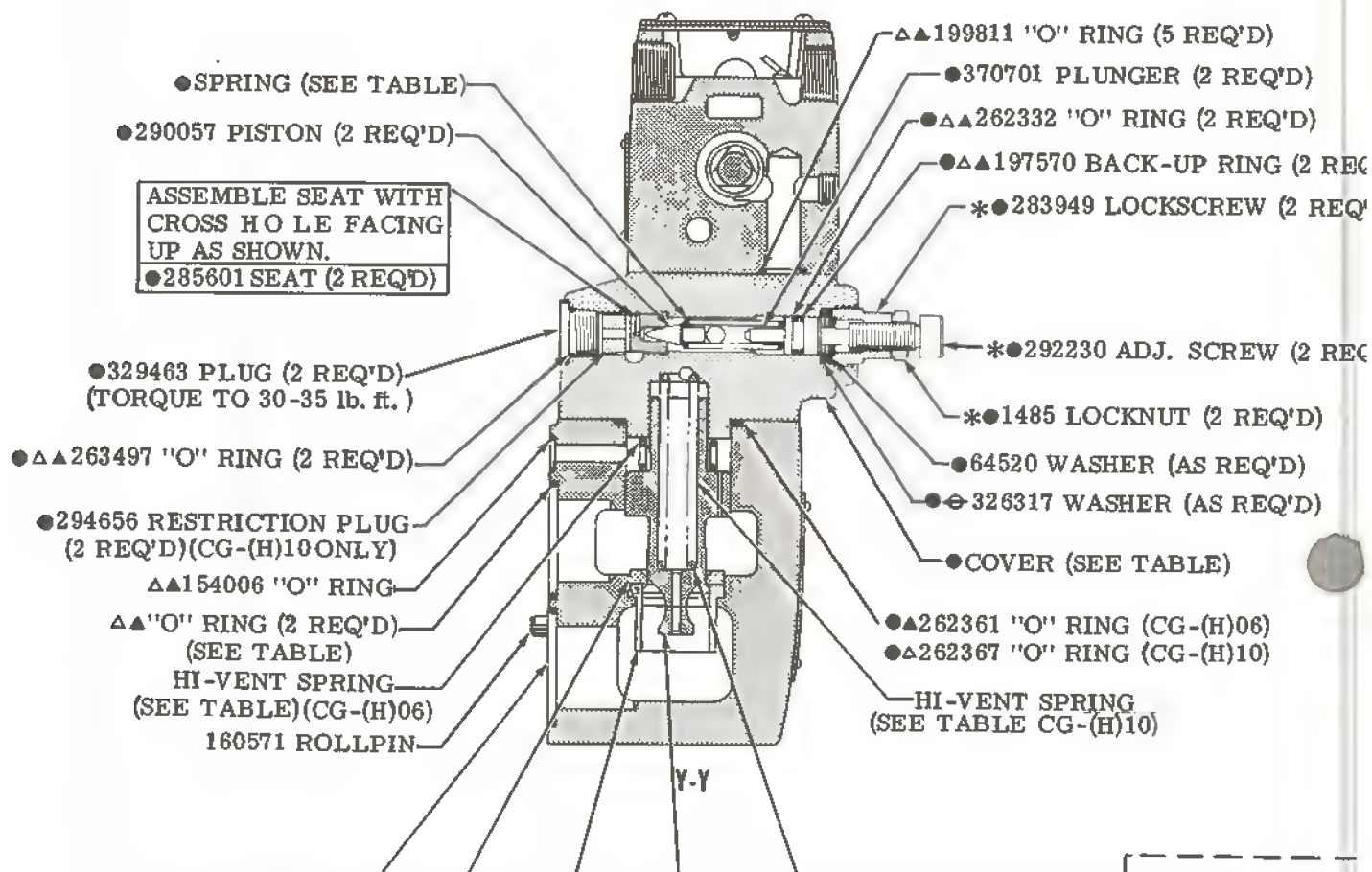
MODEL	SCREW (4 REQ'D)	LOCKWASHER (4 REQ'D)
CG-(H)06	1036	68907
CG-(H)10	1076	68909

WARNING
DO NOT USE OTHER THAN A DG4S4-010A-*-50 OR A DG4S4-010N-*-51 DIRECTIONAL VALVE AS THE PILOT FOR THIS RELIEF VALVE. USE OF A DIFFERENT PILOT CAN BLOCK THE RELIEF VALVE, CAUSING EXCESSIVE SYSTEM PRESSURE.

INSTA-PLUG CONNECTORS FOR THE DG4S4 PILOT STAGE ARE SHOWN ON PARTS DRAWING I-3487-S.

MODEL	HEAD #1		HEAD #3		●CG-(H)06 COVER S/A	●CG-(H)10 COVER S/A
	SPRING	PRESSURE RANGE PSI	SPRING	PRESSURE RANGE PSI		
CG-(H)06/(H)10-BC	2280	125 - 1000	583937	500 - 2000	942155	942156
CG-(H)06/(H)10-BF			2281	1500 - 3000		
CG-(H)06/(H)10-CF	583937	500 - 2000				

●INCLUDED IN
COVER SUBASSY



MODEL	"O" RING (2 REQ'D)	BODY	SEAT	SLEEVE	HYDRO CONE	LO-VENT SPRING	HI-VENT SPRING	COVER
CG-06	▲154020	580456	343153	—	343154	2077	184458	370666
CG-H06			589473	589472				
CG-10	▲154024	581703	283954	—	283952	291822	291821	370671
CG-H10			587996	400730				

USE EITHER A LO-VENT OR
HI-VENT SPRING AS SHOWN.
DO NOT USE BOTH.

*NOTE
COAT 292230 ADJ. SCREW, 283949
LOCK SCREW, AND 1485 LOCKNUT
WITH OIL PRIOR TO ASSEMBLY.

INCLUDED IN
F3CG-(H)06
SEAL KIT 919684

INCLUDED IN
F3CG-(H)10
SEAL KIT 919685

⊖THIS PART USED AT FINAL TEST TO
OBTAIN CORRECT PRESSURE RANGE

ALL SEALS, EXCEPT DIRECTIONAL VALVE &
RELIEF VALVE INTERFACE SEALS, ARE F3.
USE F3 SEAL KIT TO SERVICE ALL UNITS.

▲▲197570 BACK-UP
▲▲262332 "O" RING



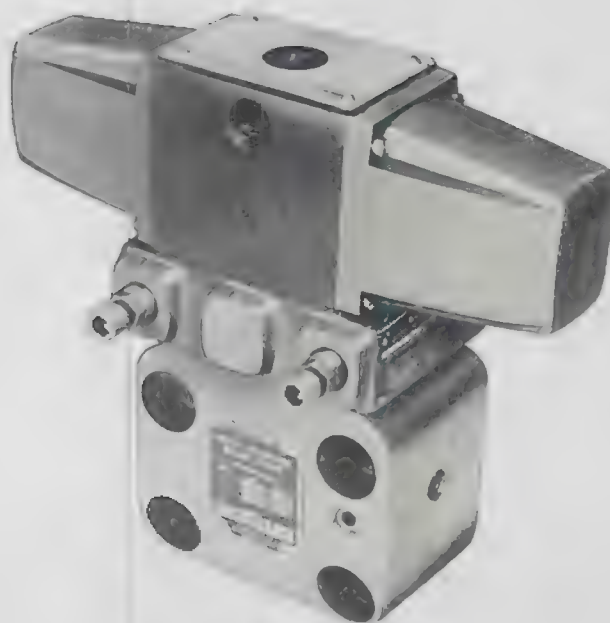
370701

329463 PLUG
SECTION SE
ARRANGEM
VENT FEAT

Service Parts Information

**Multi-
Pressure
Relief
Valves**

CG-(H)-06-*(V)-(P)*DG(L)-0*-(H)-*-20
CG-(H)-10-*(V)-(P)*DG(L)-0*-(H)-*-20



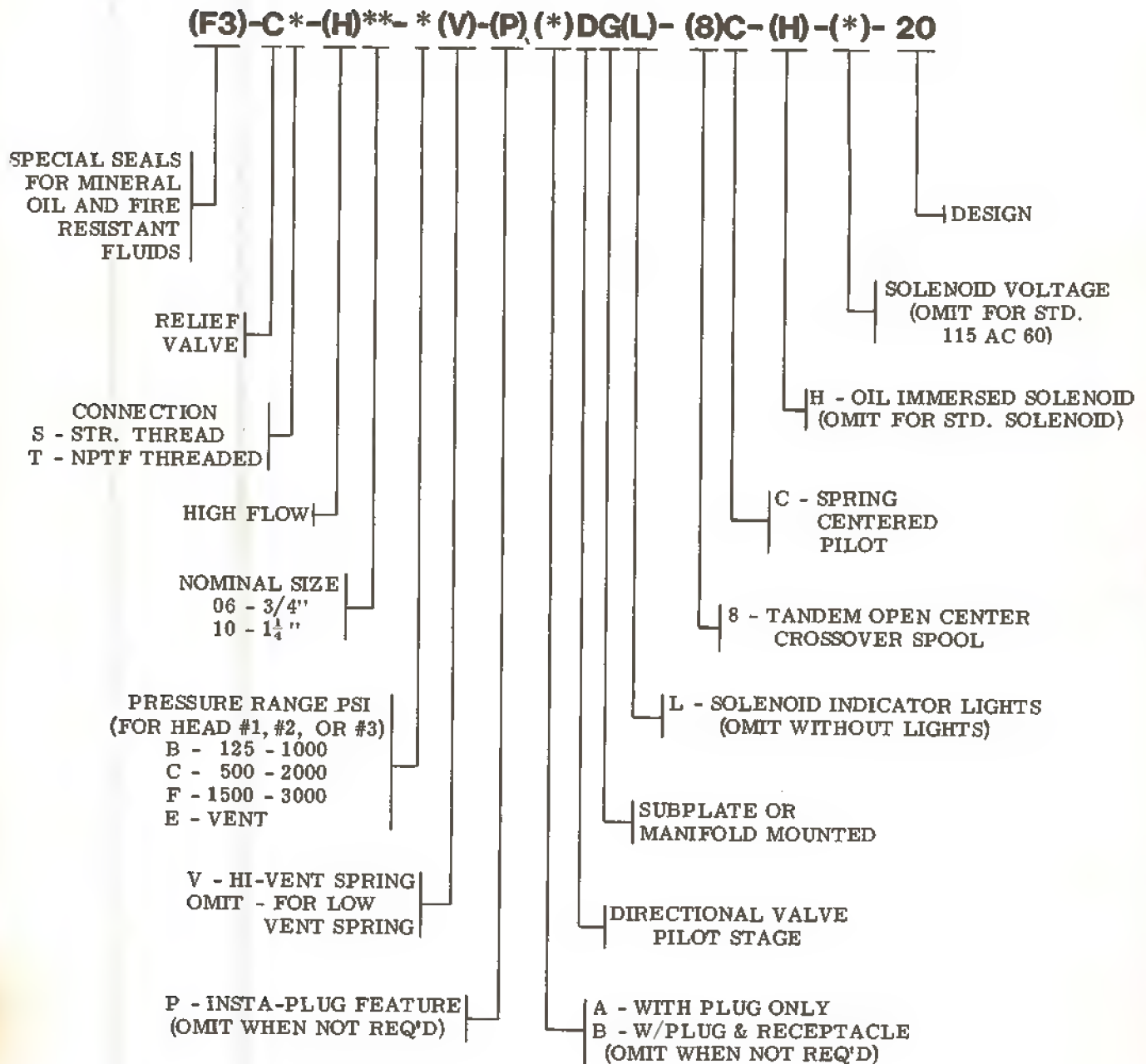
Vickers, Incorporated

P.O. Box 302
Troy, Michigan 48007-0302

Revised 11-1-85

I-3685-S

MODEL CODE BREAKDOWN



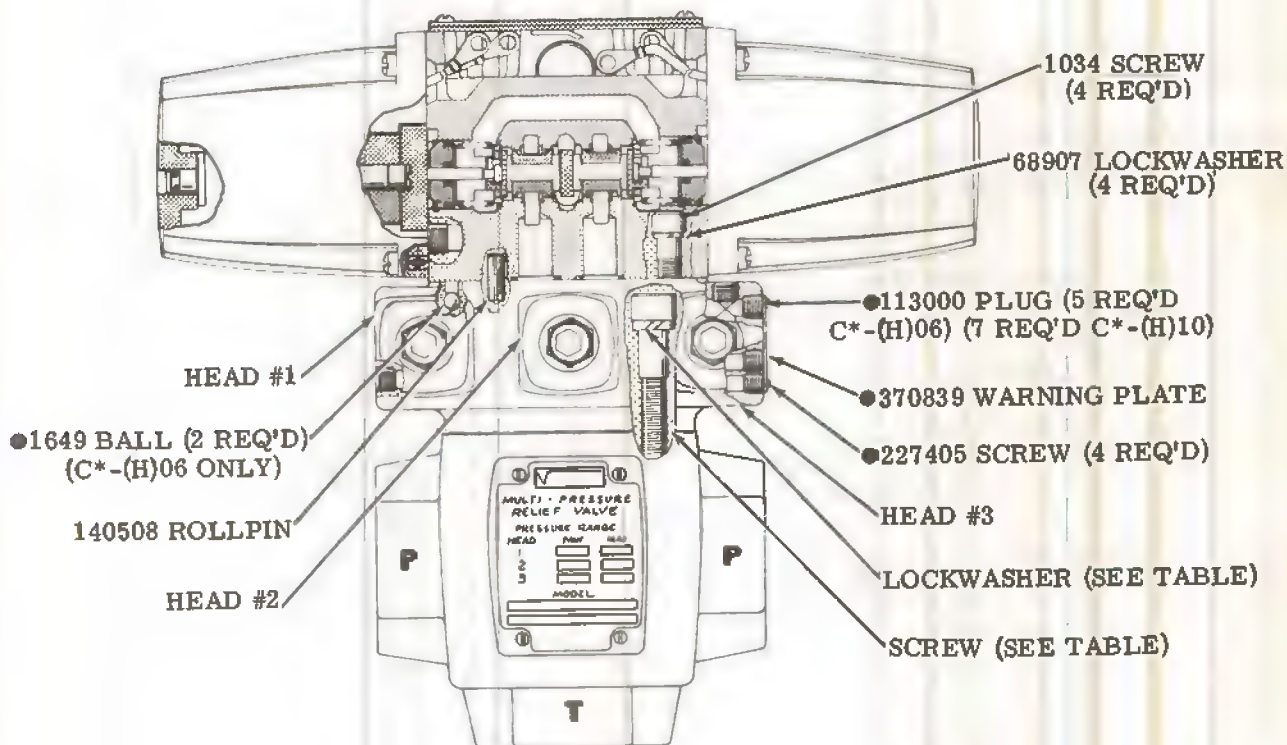
For satisfactory service life of these components, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from Vickers OFF, OFR, and OFRS series are recommended.

INSTA-PLUG CONNECTORS FOR
DG4S4 PILOT STAGE ARE SHOWN
ON DRAWING I-3487-S.

OIL IMMERSED SOLENOID
INFORMATION IS SHOWN
ON DRAWING I-3498-S.

WARNING
DO NOT USE OTHER THAN A DG4S4-018C-*50
DIRECTIONAL VALVE AS THE PILOT FOR THIS
RELIEF VALVE. USE OF A DIFFERENT PILOT
CAN BLOCK THE RELIEF VALVE CAUSING EX-
CESSIVE SYSTEM PRESSURE.

DG4S4-018C-*50 PILOT VALVE
(REFER TO I-3477-S FOR PARTS
INFORMATION)

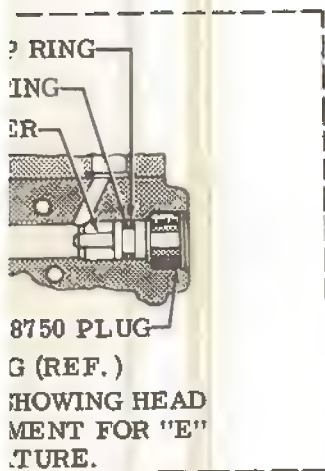


MODEL	SCREW (4 REQ'D)	LOCKWASHER (4 REQ'D)
C*-(H)06	1036	68907
C*-(H)10	1076	68909

▲INCLUDED IN
(F3)C*-(H)06
SEAL KIT 919684

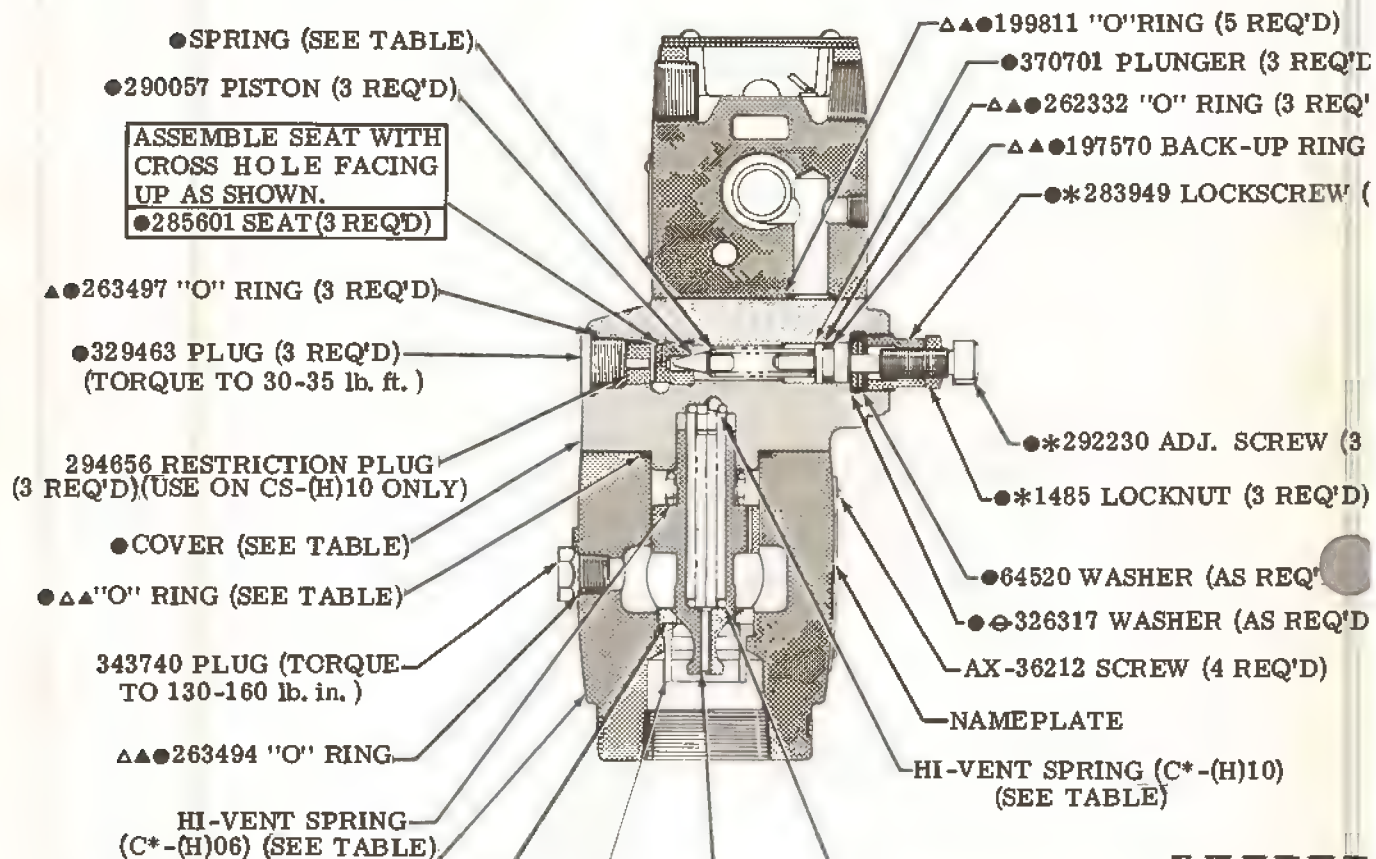
▲INCLUDED IN
(F3)C*-(H)10
SEAL KIT 919685

ALL SEALS, EXCEPT DIRECTIONAL
VALVE INTERFACE SEALS, ARE F3.
USE F3 SEAL KIT TO SERVICE UNITS.



MODEL	HEAD #1		HEAD #2		HEAD #3		CT-(H)06 COVER S/A
	● SPRING	PRESSURE RANGE PSI	● SPRING	PRESSURE RANGE PSI	● SPRING	PRESSURE RANGE PSI	
C*-(H)06/(H)10-CBF			2280	125-1000	2281	1500-3000	942198
C*-(H)06/(H)10-CEB	583937	500-2000	VENT	—	2280	125-1000	—
C*-(H)06/(H)10-CBC			2280	125-1000	583937	500-2000	942202
C*-(H)06/(H)10-FFB	2281	1500-3000	2281	1500-3000	2280	125-1000	942326

● INCLUDED IN
COVER SUBASSY



MODEL	● "O" RING	BODY	SEAT	SLEEVE	HYDRO CONE	LO-VENT SPRING	HI-VENT SPRING	COVER
CS-06		581701	343153	—	343154	2077	184458	370664
CS-H06	▲ 262361	581701	589473	589472	343154	2077	184458	370664
CS-10	▲ 262367	580430	283954	—	283952	291822	291821	370669
CS-H10		580430	587996	400730	283952	291822	291821	370669
CT-06	▲ 262361	590348	343153	—	343154	2077	184458	370664
CT-H06		590348	589473	589472	343154	2077	184458	370664
CT-10	▲ 262367	590300	283954	—	283952	291822	291821	370669
CT-H10		590300	587966	400730	283952	291822	291821	370669

*NOTE
COAT 292230 ADJ. SCREW, 283949
LOCK SCREW, & 1485 LOCK NUT
WITH OIL PRIOR TO ASSEMBLY.

USE EITHER A LO-VENT OR
HI-VENT SPRING AS SHOWN.
DO NOT USE BOTH.

⊕ THIS PART USED AT FINAL
TEST TO OBTAIN CORRECT
PRESSURE RANGE.

▲▲ 197570 BAC
▲▲ 262332 '
370701 PL

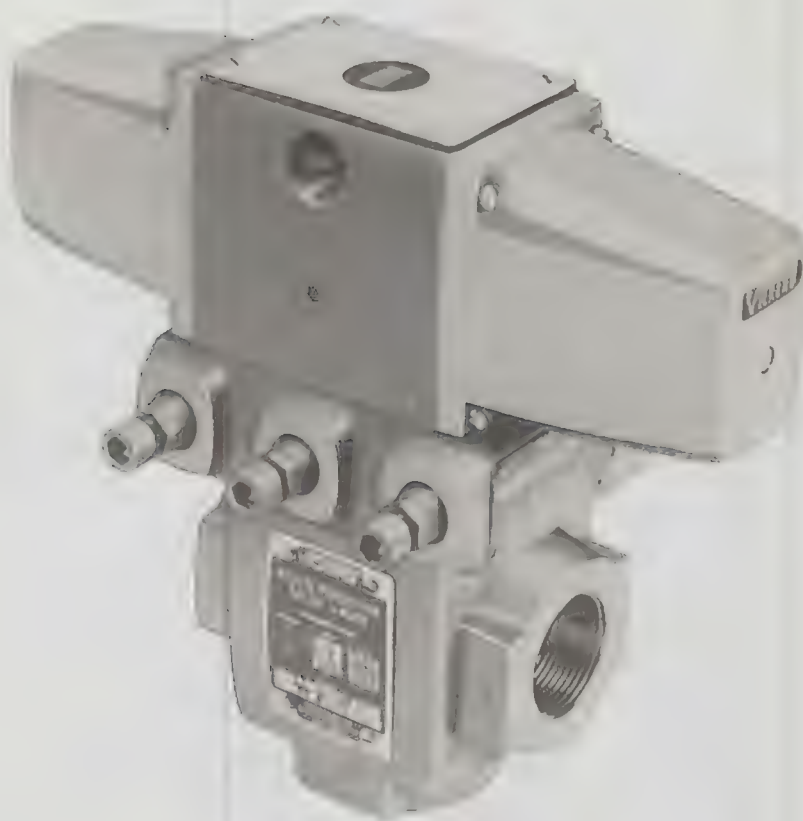
● 329463
SECT
ARRA
VENT



Service Parts Information

**Multi-
Pressure
Relief
Valves**

CS/CT-(H)-06-*(V)-(P)(*)DG(L)-(8)C-(H)-(*)-20
CS/CT-(H)-10-*(V)-(P)(*)DG(L)-(8)C-(H)-(*)-20



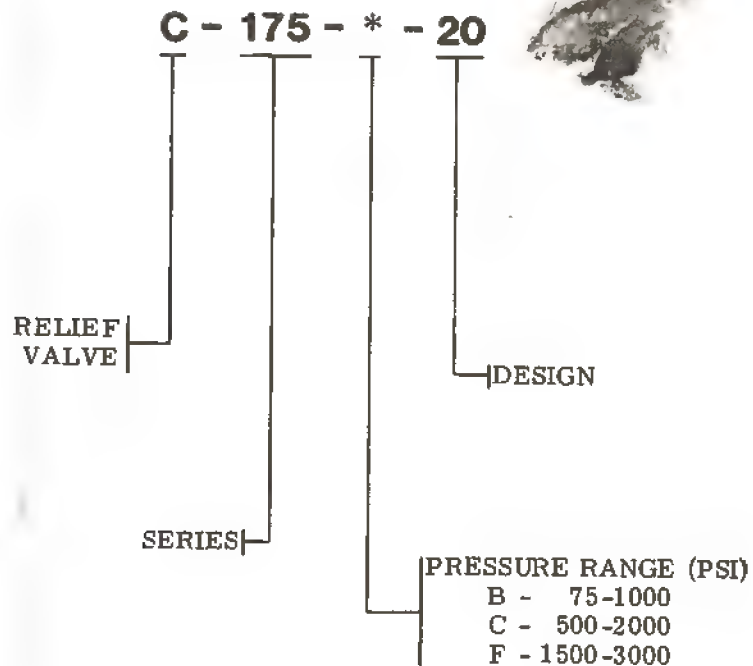
Vickers, Incorporated

1401 Crooks Road
Troy, Michigan 48084

Revised 11-1-85

I-3686-S

MODEL CODE BREAKDOWN



For satisfactory service life of these components in industrial applications, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from Vickers OFP, OFR, and OFRS series are recommended.

Litho in U. S. A.

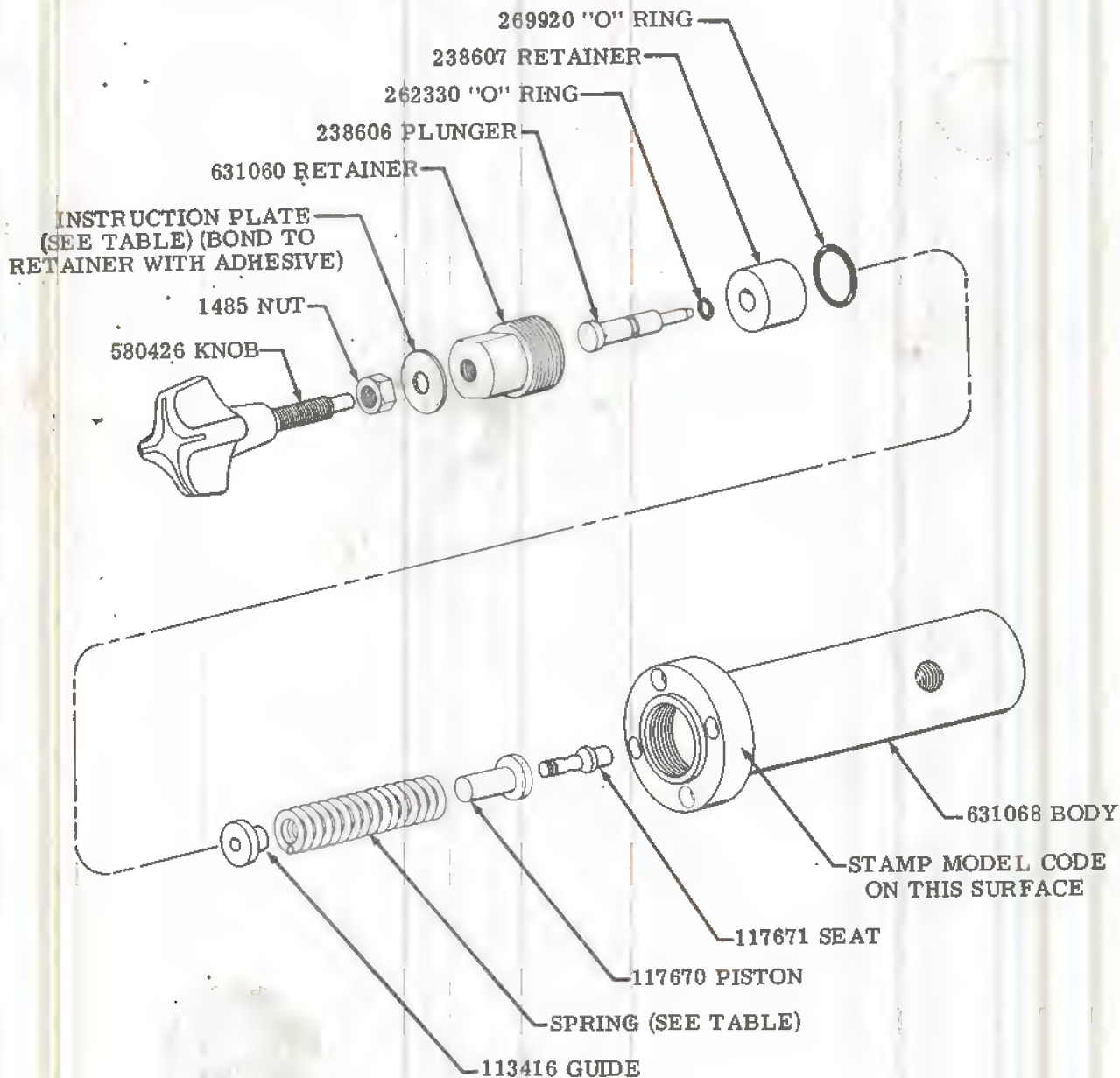
Service Parts Information

VICKERS

A TRIMONA COMPANY

REMOTE CONTROL PRESSURE RELIEF VALVES

C-175-* -20



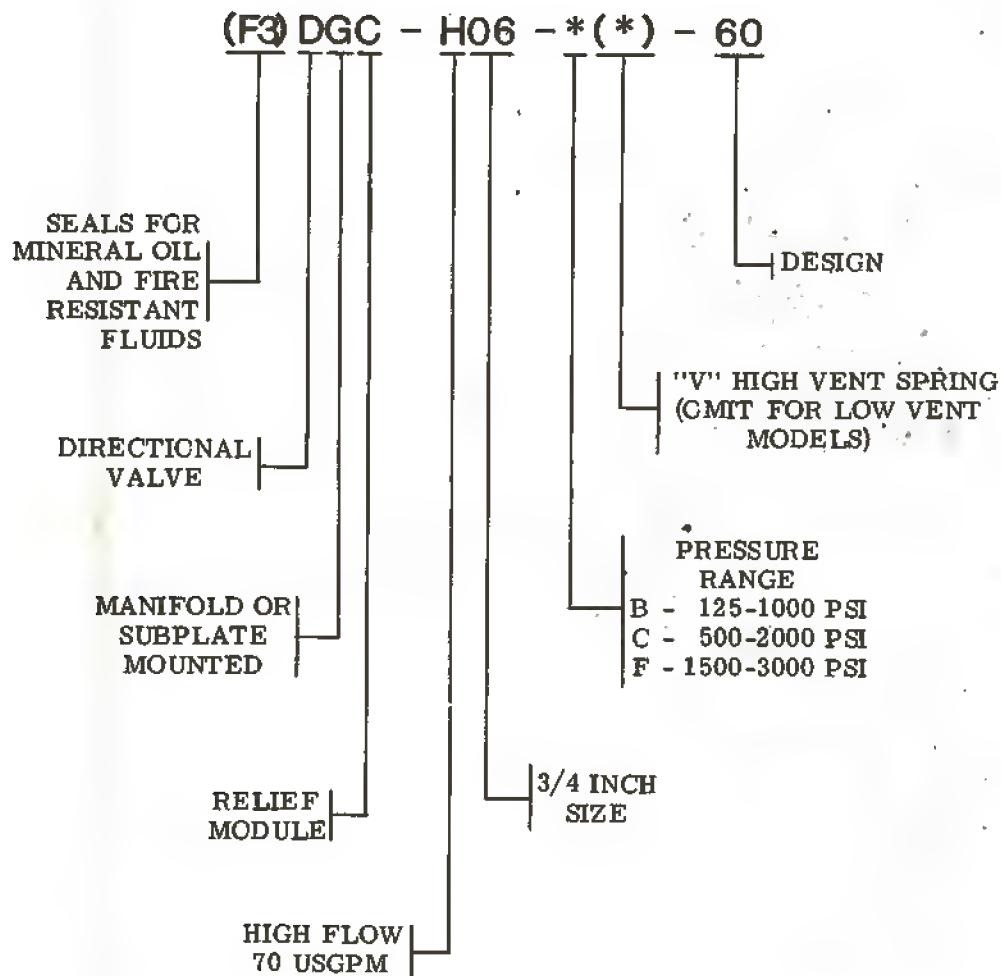
MODEL	SPRING	PRESSURE RANGE	INSTRUCTION PLATE
C-175-B-20	152609	75 - 1000	631057
C-175-C-20	152610	500 - 2000	631058
C-175-F-20	135007	1500 - 3000	631059

Vickers, Incorporated
P.O. Box 302
Troy, Michigan 48007-0302

Revised 8-1-85

I-3889-S

MODEL CODE BREAKDOWN



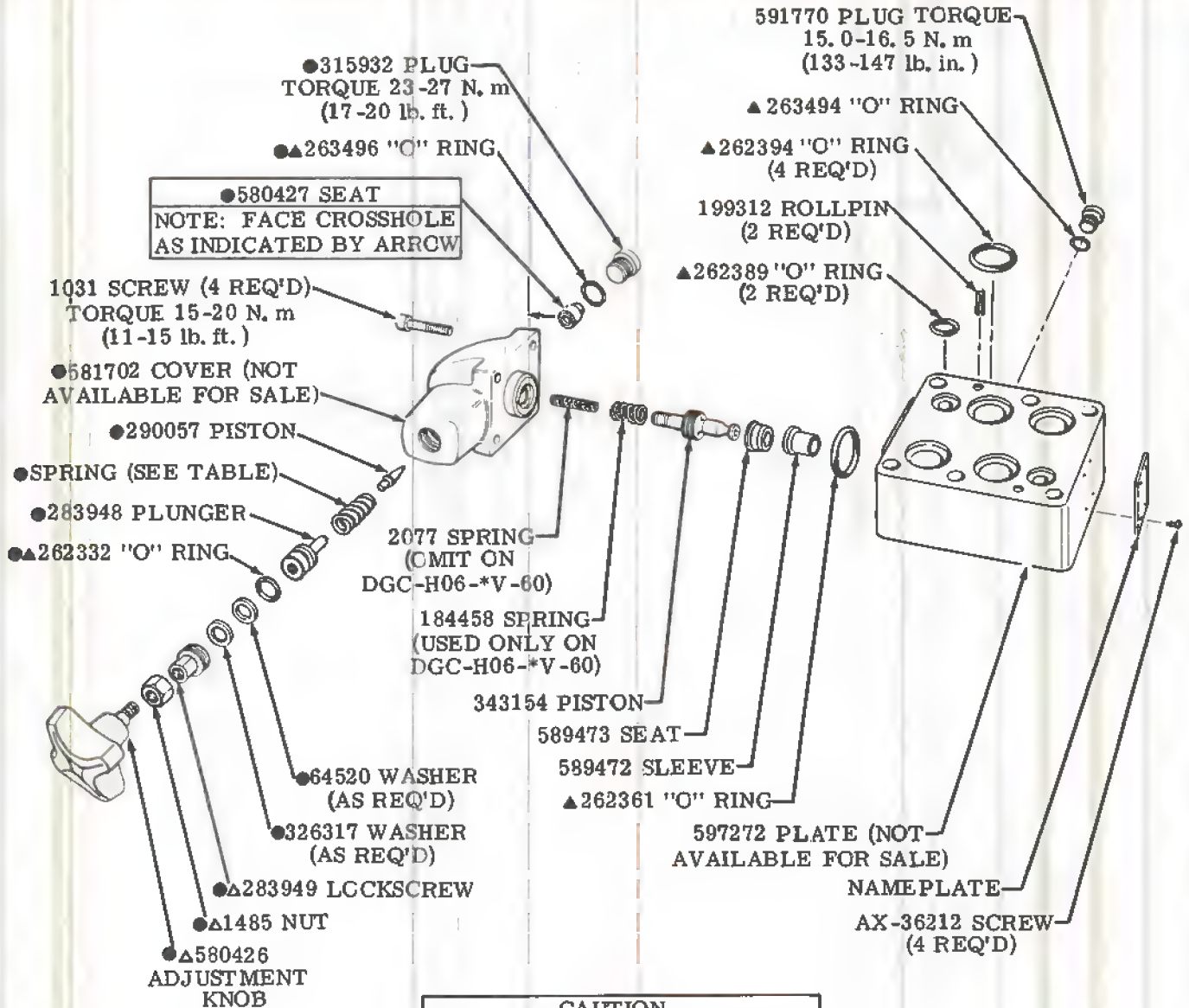
For satisfactory service life of these components in industrial applications, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from Vickers OFF, OFR, and OFRS series are recommended.

Service Parts Information

VICKERS
A TRIMCOVA COMPANY

HIGH FLOW RELIEF VALVE MODULE

(F3)DGC-H06-*(*)-60



CAUTION
THIS MODULE CANNOT BE USED
WITH PRESSURE CENTERED (D)
VALVES.

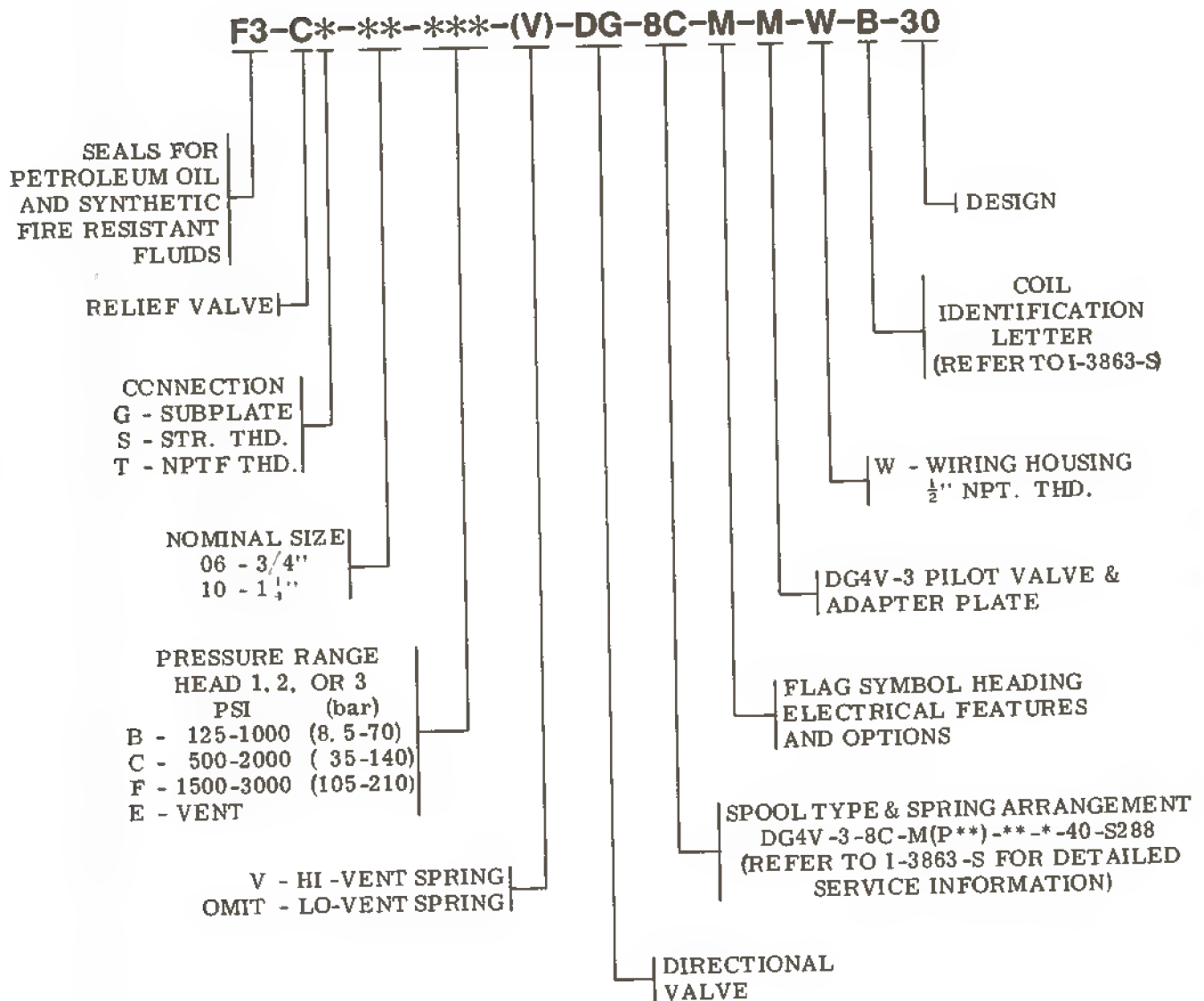
●INCLUDED IN
COVER S/A KIT

▲COAT WITH
OIL PRIOR
TO ASSEMBLY

MODEL	●COVER S/A KIT	●SPRING
DGC-H06-B*-60	941280	2280
DGC-H06-C*-60	941281	583937
DGC-H06-F*-60	941282	2281

▲SERVICE ALL UNITS
W/ F3 SEAL KIT 919655

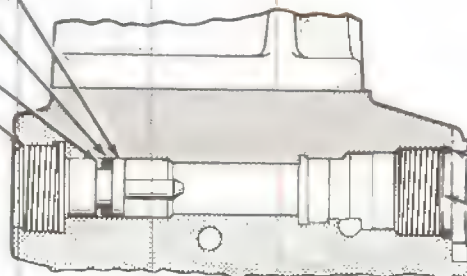
MODEL CODE BREAKDOWN



For satisfactory service life of these components, use full flow filtration to provide fluid which meets ISO cleanliness code 18 15 or cleaner. Selections from Vickers OFP, OFR, and OFRS series are recommended.

Litho in U. S. A.

370701 PLUNGER
 ▲▲262332 "O" RING
 ▲▲197570 BACK-UP RING
 218750 PLUG*



SECTION SHOWING HEAD
 ARRANGEMENT FOR "E"
 VENT FEATURE.

▲▲ 263497 "O" RING
 329463 PLUG*
 TORQUE 39-43 lb.ft.
 (52.8-58.3 N.m)

HI-VENT SPRING FOR C*-10
 LO-VENT SPRING FOR C*-06/10
 (SEE TABLE)

HI-VENT SPRING
 (C*-06 ONLY)
 (SEE TABLE)

HYDROCONE (SEE TABLE)

SEAT (SEE TABLE)

▲▲"O" RING (SEE TABLE)

◆ CT OR CS BODY (SEE TABLE)
 (CT SHOWN)

▲▲ 263494 "O" RING

343740 PLUG*
 TORQUE 133-147 lb. in.
 (14.5-17.9 N.m)

PART	KIT	PART	KIT
1485	944064	226816	944071
1649	944067	227405	944074
AX-36212	944053	292230	944072
64520	944068	326317	944073
113000	944055	329463	944041
160571	944069	343740	944038
218750	944070		

PARTS WITH* AVAILABLE ONLY
 IN KITS OF 25. REFERENCE KIT
 ON PARTS ORDER.

MODEL	◆ BODY	
	-06	-10
CG-	580456	581703
CS-	581701	580430
CT-	590348	590300

AMEPLATE
 X-36212 SCREW*
 (4 REQ'D)

▲▲154006 "O" RING

"O" RING (2 REQ'D)	MODEL
▲154020	CG-06
▲154024	CG-10

160571 ROLL PIN*

◆ CG BODY (SEE TABLE)

▲▲263494 "O" RING (2 REQ'D)

343740 PLUG (2 REQ'D)*
 TORQUE 133-147 lb. in.
 (14.9 - 16.5 N.m)

*AVAILABLE ONLY IN KITS OF 25
 ▲INCLUDED IN F3 -06 SEAL KIT 919684
 ▲INCLUDED IN F3 -10 SEAL KIT 919685
 ◆NOT AVAILABLE FOR SALE

DG4V3-8C-M-**-40-S288
PILOT VALVE (REFER
TO I-3863-S FOR PARTS
INFORMATION)

255698 BOLT KIT
TORQUE 40-50 lb.in.
(4.5-5.6 N.m)
(PILOT VALVE TO
ADAPTER PLATE)
(NOT SHOWN)

255651 BOLT KIT
TORQUE 11-15 lb.ft.
(14.9-20.3 N.m)
(ADAPTER PLATE
TO COVER)

422814 ADAPTER PLATE

113000 PLUG (4 REQ'D) *

▲▲●262334 "O" RING (4 REQ'D)

226816 ROLL PIN *

●1649 BALL (2 REQ'D) *
(C*-06 ONLY)

●COVER (SEE TABLE)

●290057 PISTON (3 REQ'D)

●COVER SPRING (SEE TABLE)

▲▲●262332 "O" RING
(3 REQ'D)

▲▲●197570 BACK-UP
RING (3 REQ'D)

●370701 PLUNGER (3 REQ'D)

●●326317 WASHER (AS REQ'D) *

●●64520 WASHER (AS REQ'D) *

●●283949 LOCKSCREW (3 REQ'D)

●●1485 LOCKNUT (3 REQ'D) *

●●292230 ADJ. SCREW (3 REQ'D) *

WARNING
USE ONLY A DG4V-3-8C-M-**-40-S288
DIRECTIONAL VALVE AS A PILOT FOR
THIS RELIEF VALVE. USE OF A DIF-
FERENT PILOT CAN BLOCK RELIEF
VALVE, CAUSING EXCESSIVE SYSTEM
PRESSURE.

●329463 PLUG (3 REQ'D) *
TORQUE 39-43 lb.ft.
(52.8-58.3 N.m)

▲▲●263497 "O" RING (3 REQ'D)

294656 RESTRICTOR PLUG
(3 REQ'D) (C*-10 ONLY)

●285601 SEAT (3 REQ'D)
ASSEMBLE CROSSHOLE
FACING UP.

●113000 PLUG *
(C*-06 5 REQ'D)
(C*-10 7 REQ'D)

●370839 WARNING PLATE

●227405 SCREW (4 REQ'D) *

LOCKWASHER (SEE TABLE)

SCREW (SEE TABLE)
(COVER TO BODY)

MODEL	COVER SPRING	PRESSURE RANGE PSI - (bar)	COVER KITS FOR C*-06-*** ARE AVAILABLE FOR SEVERAL SPRING ARRANGEMENTS.	
			SPRING ORDER IN HEAD	●INCLUDED IN KIT (-06 ONLY)
C*-***-B	2280	125-1000 (8.5-70)	1 2 3	
C*-***-C	583937	500-2000 (35-140)	-CBF-	942198
C*-***-F	2281	1500-3000 (105-210)	-CBC-	942202
			-FFB-	942326

MODEL	SCREW (4 REQ'D)	TORQUE		L/WASHER (4 REQ'D)
		lb. ft.	N. m	
C*-06	1036	11-15	14.9-20.3	68907
C*-10	1076	35-43	47.5-58.3	68909

***NOTE**
COAT 292230 ADJ. SCREW, 283949
LOCKSCREW AND 1485 LOCKNUT
WITH OIL PRIOR TO ASSEMBLY.

MODEL	"O" RING	SEAT	HYDRO CONE	LO-VENT SPRING	HI-VENT SPRING	COVER?
C*-06	●▲262361	343153	343154	2077	184458	370664
C*-10	▲262367	283954	283952	291822	291821	370669

NOTE: USE EITHER A LO-VENT OR HI-VENT SPRING.
DO NOT USE BOTH. SEE MODEL CODE

●THIS PART USED AT FINAL
TEST TO OBTAIN CORRECT
PRESSURE RANGE.

VICKERS®

A TRIMCO COMPANY

Service Parts Information

**Multi-
Pressure
Relief
Valve**

CG/CS/CT-06-**-*(V)-DG8C(P)(L)-M(***)-M-**-*-30
CG/CS/CT-10-**-*(V)-DG8C(P)(L)-M(***)-M-**-*-30



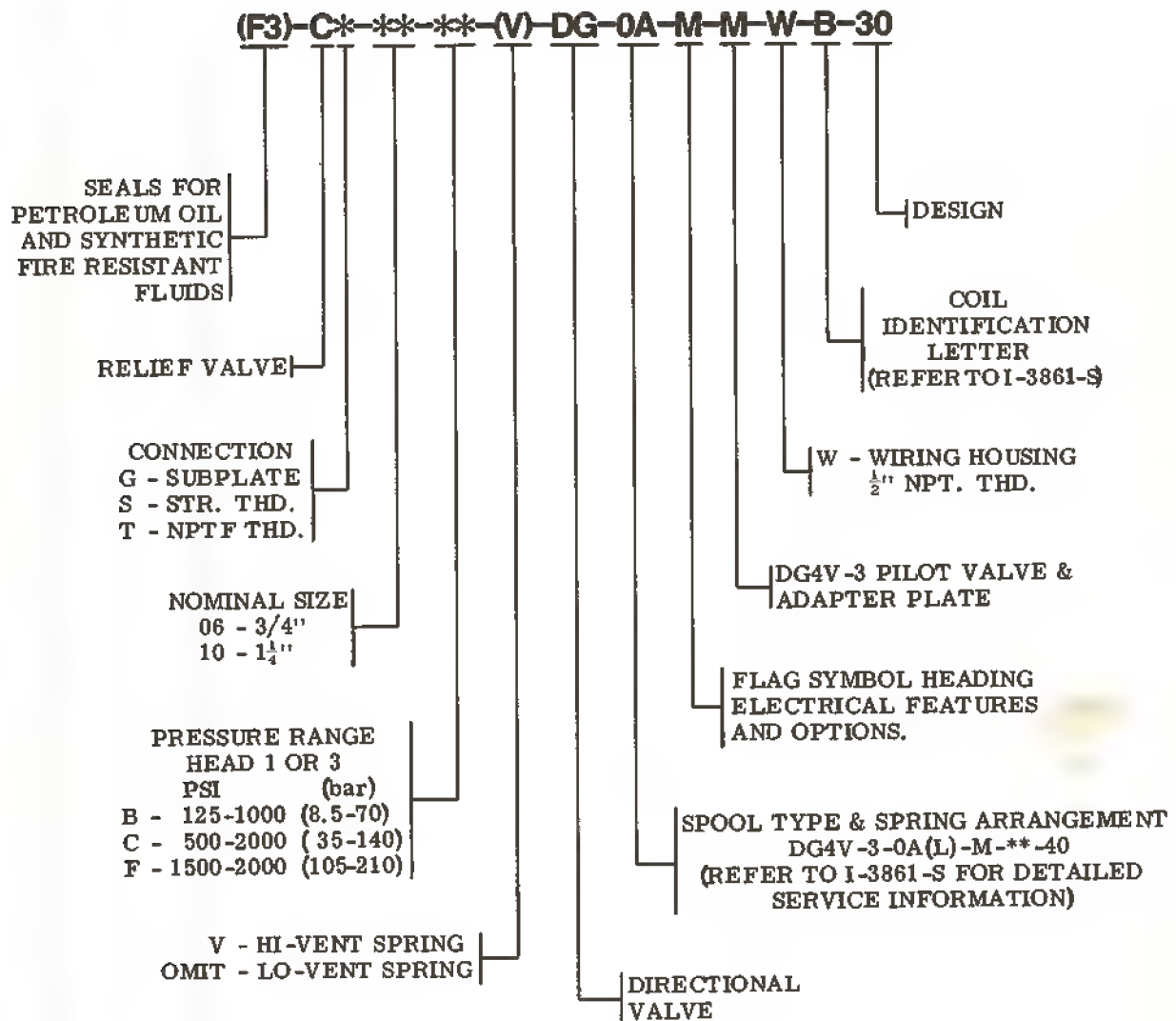
Vickers, Incorporated

P.O. Box 302
Troy, Michigan 48007-0302

Released 8-1-86

I-3692-S

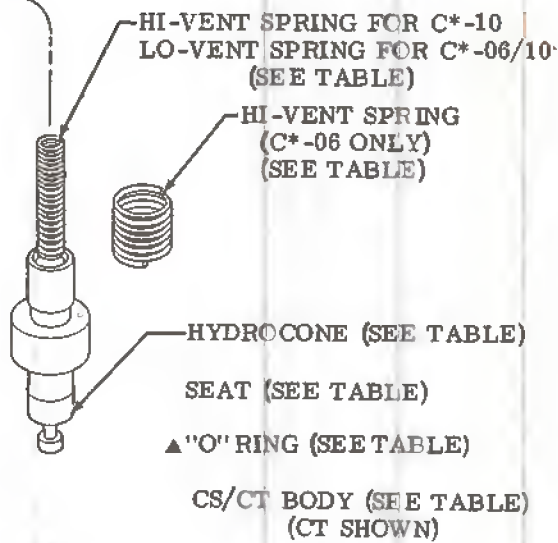
MODEL CODE BREAKDOWN



For satisfactory service life of these components in industrial applications, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from Vickers OFP, OFR, and OFRS series are recommended.

Litho in U. S. A.

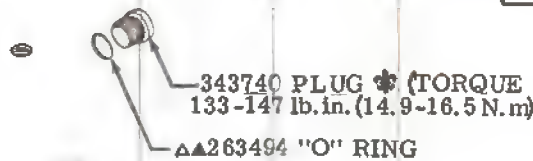
SECTIONAL 'E' VENT HEAD 1 of 3



PART	KIT	PART	KIT
1485	944064	226816	944071
AX-36212	944053	227405	944074
64520	944068	292230	944072
113000	944055	326317	944073
160571	944069	329463	944041
218750	944070	343740	944038

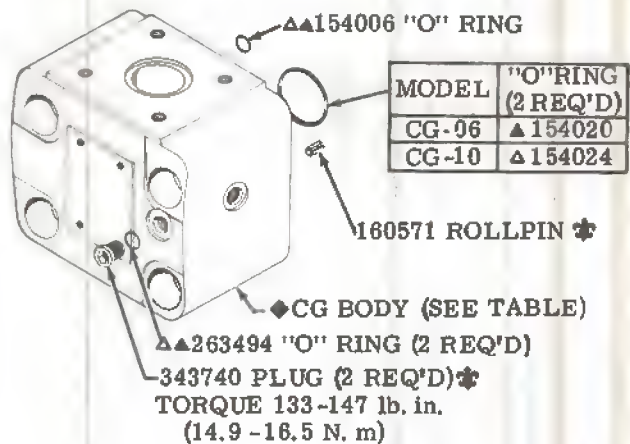
PARTS WITH * AVAILABLE ONLY
 IN KITS OF 25. REFERENCE KIT
 ON PARTS ORDER.

MODEL	◆ BODY	
	-06	-10
CG	580456	581703
CS	581701	580430
CT	590348	590300



NAMEPLATE
 AX-36212 SCREW
 (4 REQ'D) *

- * AVAILABLE ONLY IN KITS OF 25.
- ▲ INCLUDED IN -06 F3 SEAL KIT 919684
- ▲ INCLUDED IN -10 F3 SEAL KIT 919685
- INCLUDED IN CT-06-BC COVER KIT 942155
- INCLUDED IN CT-10-BC COVER KIT 942156
- ◆ NOT AVAILABLE FOR SALE



DG4V3-0A(L)-M-*-40
PILOT VALVE (REFER
TO I-3861-S FOR PARTS
INFORMATION)

255698 BOLT KIT
TORQUE 40-50 lb. in.
(4.5-5.6 N. m)
(PILOT VALVE TO
ADAPTER PLATE)
(NOT SHOWN)

255651 BOLT KIT
TORQUE 11-15 lb. ft.
(14.9-20.3 N. m)
(ADAPTER PLATE
TO COVER)

422814 ADAPTER PLATE

113000 PLUG (4 REQ'D)*

▲▲262334 "O" RING (4 REQ'D)

226816 ROLL PIN*

○ COVER (SEE TABLE)

○●290057 PISTON (2 REQ'D)

○ COVER SPRING
(SEE TABLE)

○●▲▲262332 "O" RING
(2 REQ'D)

○●▲▲197570 BACK-UP
RING (2 REQ'D)

○●370701 PLUNGER
(2 REQ'D)

○●326317 WASHER*
(AS REQ'D)

○●64520 WASHER (AS REQ'D)*

○●*283949 LOCKSCREW (2 REQ'D)

○●*1485 LOCKNUT (2 REQ'D)*

○●*292230 ADJ. SCREW (2 REQ'D)*

WARNING
USE ONLY A DG4V-3-0A-M**-40 OR
DG4V-3-0AL-M**-40 DIRECTIONAL
VALVE AS A PILOT FOR THIS RELIEF
VALVE. USE OF A DIFFERENT PILOT
CAN BLOCK RELIEF VALVE, CAUS-
ING EXCESSIVE SYSTEM PRESSURE

○●329463 PLUG (3 REQ'D)*
TORQUE 39-43 lb. ft.
(52.8-58.3 N. m)

○●▲▲263497 "O" RING (2 REQ'D)

○294656 RESTRICTOR PLUG
(2 REQ'D) (C*-10 ONLY)

○●285601 SEAT (2 REQ'D)
ASSEMBLE CROSSHOLE
FACING UP

113000 PLUG*
● (C*-06 5 REQ'D)
○ (C*-10 7 REQ'D)

○●370839 WARNING PLATE

○●227405 SCREW (4 REQ'D)*

LOCKWASHER (SEE TABLE)

SCREW (SEE TABLE)
(COVER TO BODY)

MODEL	SCREW (4 REQ'D)	TORQUE		L WASHER (4 REQ'D)
		lb. ft.	N. m	
C*-06	1036	11-15	14.9-20.3	68907
C*-10	1076	35-43	47.5-58.3	68909

***NOTE**

COAT 292230 ADJ. SCREW, 283949
LOCKSCREW AND 1485 LOCKNUT
WITH OIL PRIOR TO ASSEMBLY.

⊕ THIS PART USED AT FINAL
TEST TO OBTAIN CORRECT
PRESSURE RANGE.

MODEL	"O" RING	SEAT	HYDRO CONE	LO-VENT SPRING	HI-VENT SPRING	COVER
C*-06	▲262361	343153	343154	2077	184458	●370666
C*-10	▲262367	283954	283952	291822	291821	○370671

NOTE: USE EITHER A LO-VENT OR HI-VENT SPRING.
DO NOT USE BOTH. (SEE MODEL CODE)

MODEL	COVER SPRING	PRESSURE RANGE PSI (bar)
C*-**-B	2280	125-1000 (8.5-70)
C*-**-C	583937	500-2000 (35-140)
C*-**-F	2281	1500-3000 (105-210)

Service Parts Information

**Multi-
Pressure
Relief
Valve**

CG/CS/CT-06-**-*(*)-(V)-DG0A(P)(L)-M(***)-M-**-*-30

CG/CS/CT-10-**-*(*)-(V)-DG0A(P)(L)-M(***)-M-**-*-30



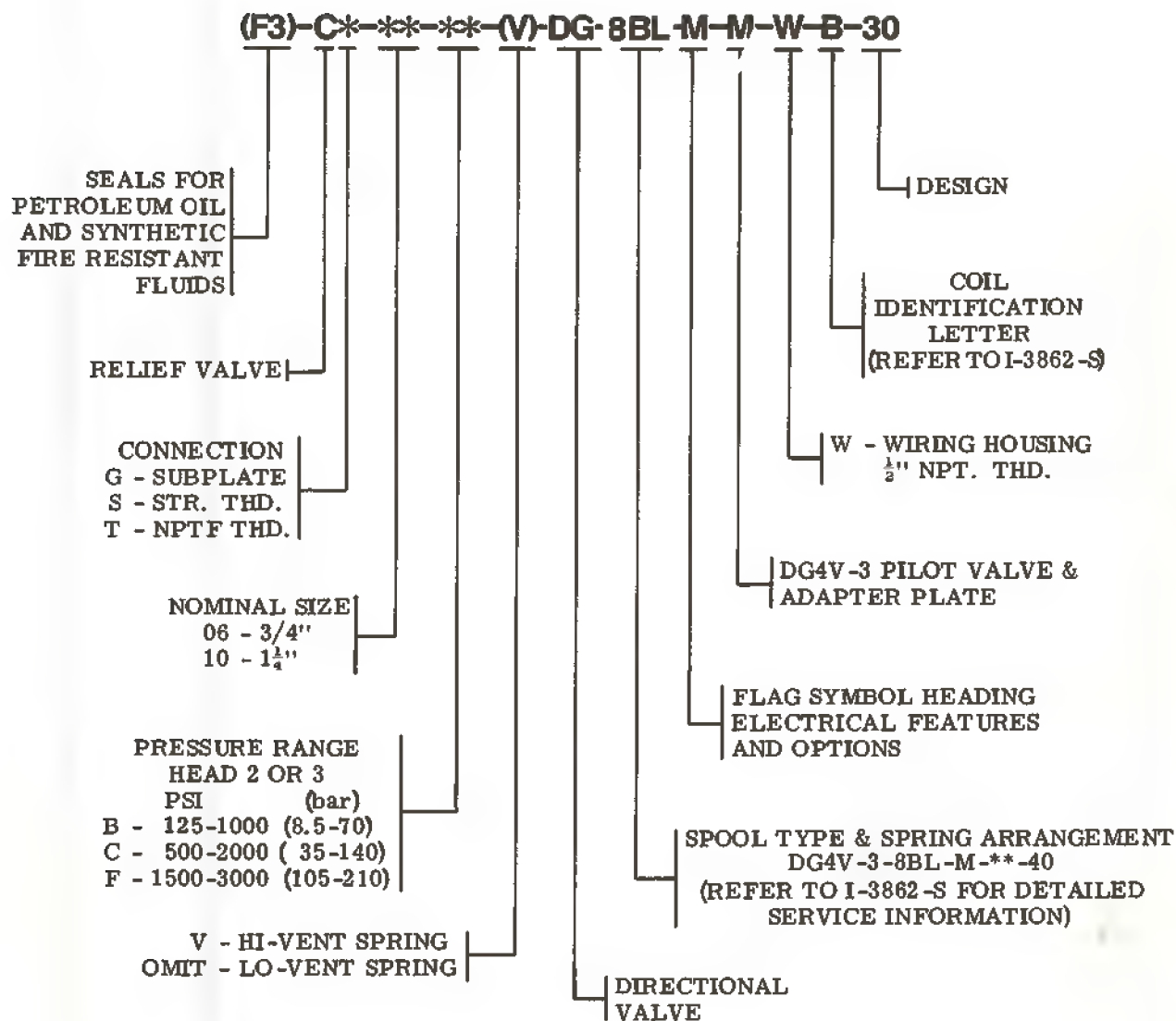
Vickers, Incorporated

P.O. Box 302
Troy, Michigan 48007-0302

Released 8-1-86

I-3693-S

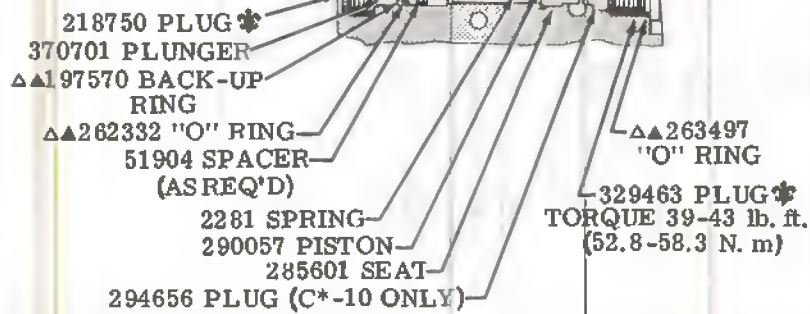
MODEL CODE BREAKDOWN



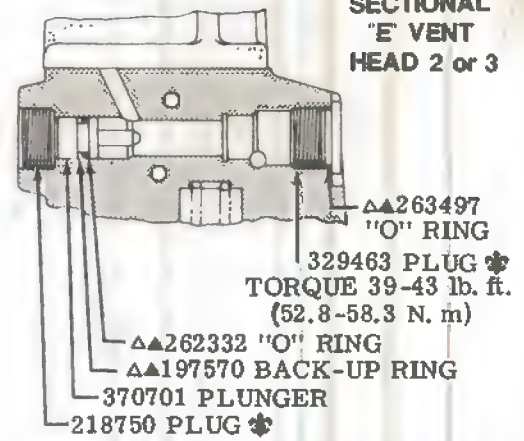
For satisfactory service life of these components in industrial applications, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from Vickers OFP, OFR, and OFRS series are recommended.

Litho in U. S. A.

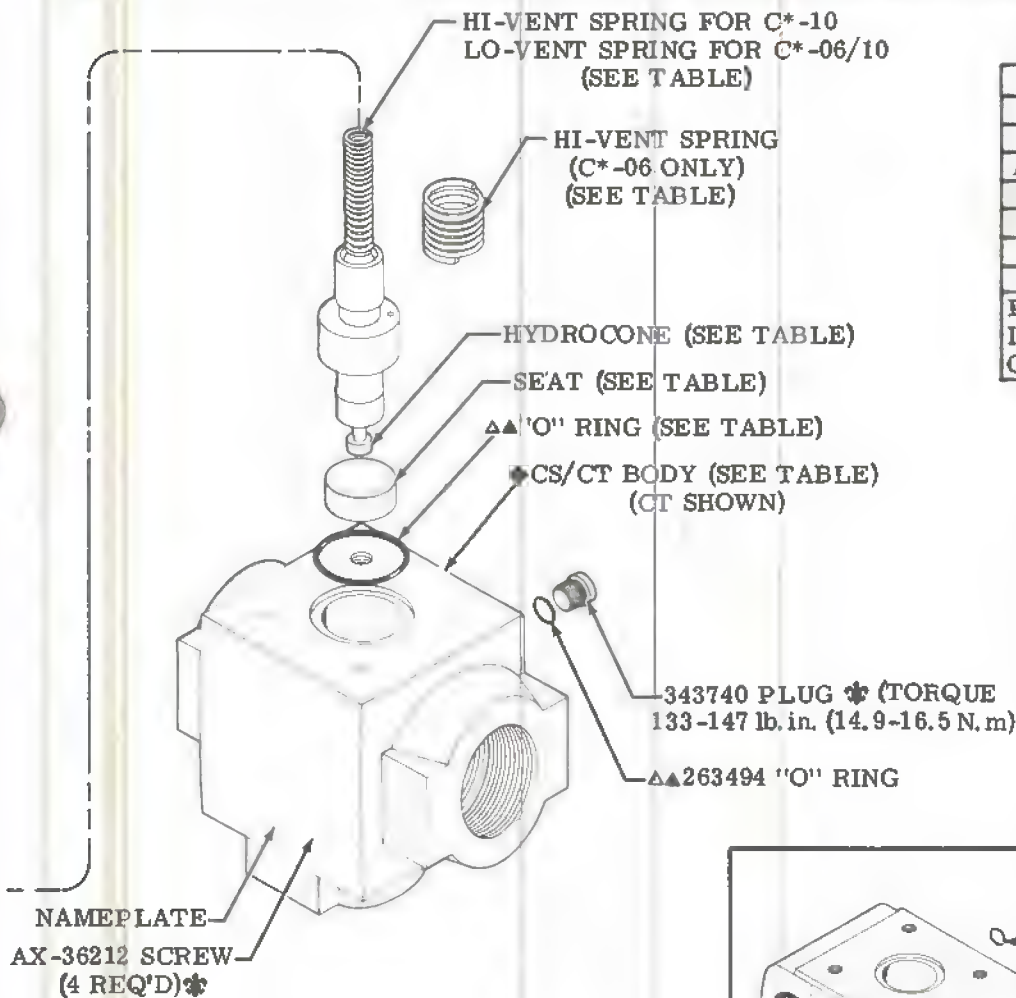
SECTIONAL HEAD 1 INOPERATIVE



SECTIONAL "E" VENT HEAD 2 or 3

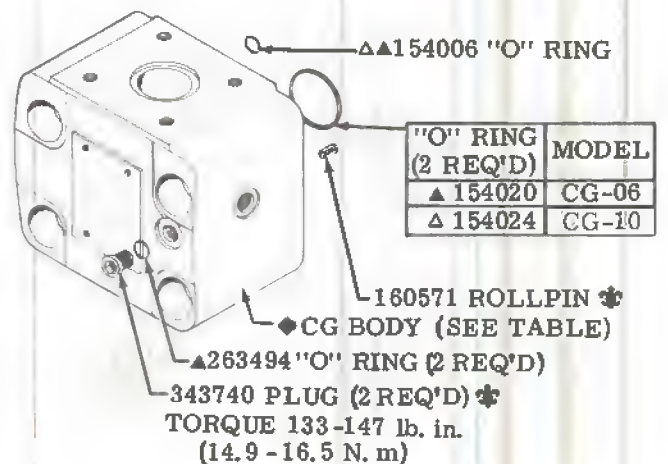


PART	KIT	PART	KIT
1485	944064	226816	944071
1649	944067	227405	944074
AX-36212	944053	292230	944072
64520	944068	326317	944073
113000	944055	329463	944041
160571	944069	343740	944038
218750	944070		
PARTS WITH * AVAILABLE ONLY IN KITS OF 25. REFERENCE KIT ON PARTS ORDER.			

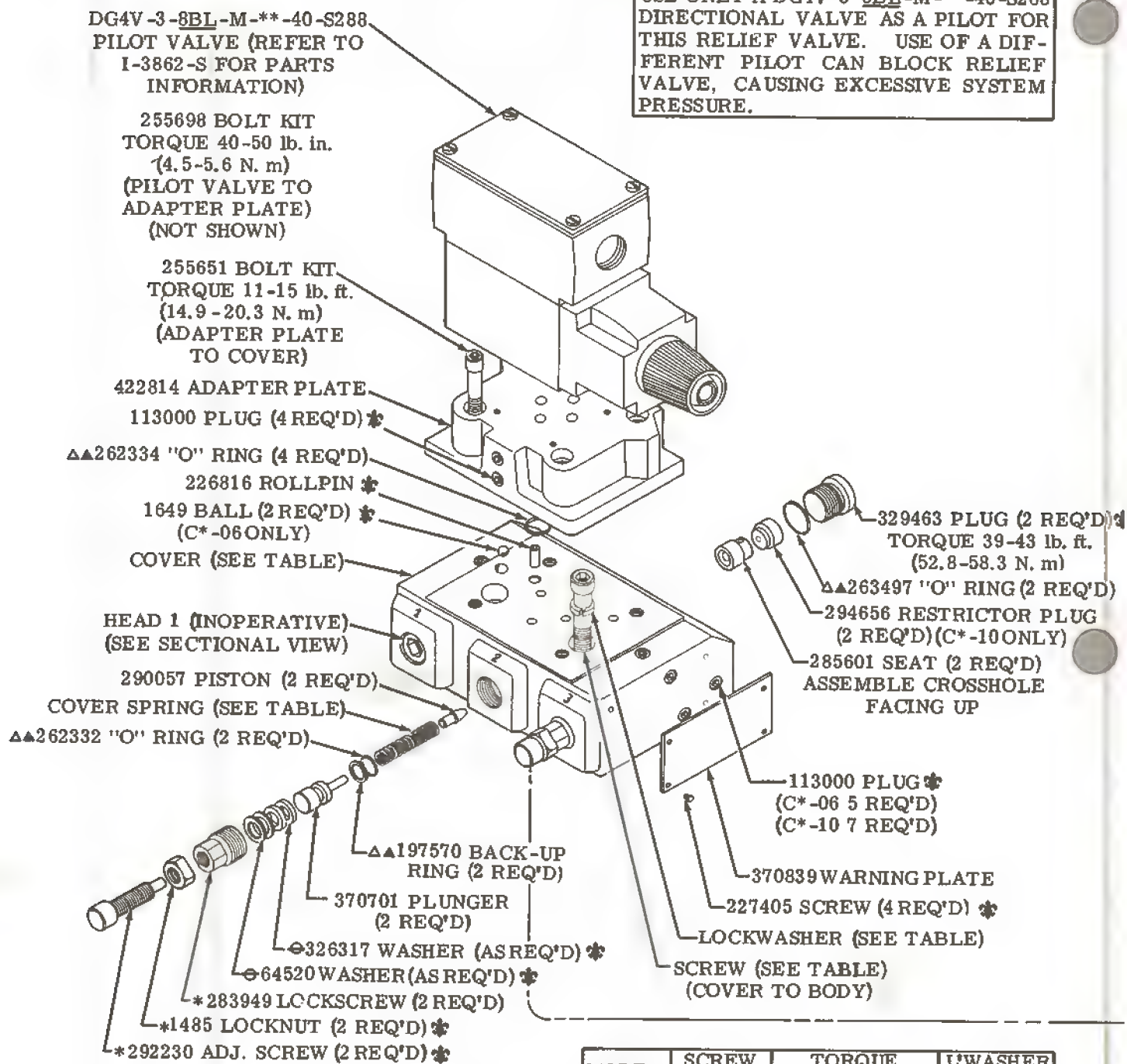


MODEL	BODY	
	-06	-10
CG	580456	581703
CS	581701	580430
CT	590348	590300

▲ INCLUDED IN -06 F3 SEAL KIT 919684
 ▲ INCLUDED IN -10 F3 SEAL KIT 919685
 ◆ NOT AVAILABLE FOR SALE
 * AVAILABLE ONLY IN KITS OF 25



WARNING
USE ONLY A DG4V-3-8BL-M-**-40-S288 DIRECTIONAL VALVE AS A PILOT FOR THIS RELIEF VALVE. USE OF A DIFFERENT PILOT CAN BLOCK RELIEF VALVE, CAUSING EXCESSIVE SYSTEM PRESSURE.



MODEL	SCREW (4 REQ'D)	TORQUE		L'WASHER (4 REQ'D)
		lb. ft.	N. m	
C*-06	1036	11-15	14.9-20.3	68907
C*-10	1076	35-43	47.5-58.3	68909

***NOTE**
COAT 292230 ADJ. SCREW, 283949 LOCKSCREW AND 1485 LOCKNUT WITH OIL PRIOR TO ASSEMBLY.

⊗ THIS PART USED AT FINAL TEST TO OBTAIN CORRECT PRESSURE RANGE.

MODEL	"C" RING	SEAT	HYDRO CONE	LO-VENT SPRING	HI-VENT SPRING	COVER
C*-06	Δ 262361	343153	343154	2077	184458	370664
C*-10	Δ 262367	283954	283952	291822	291821	370669

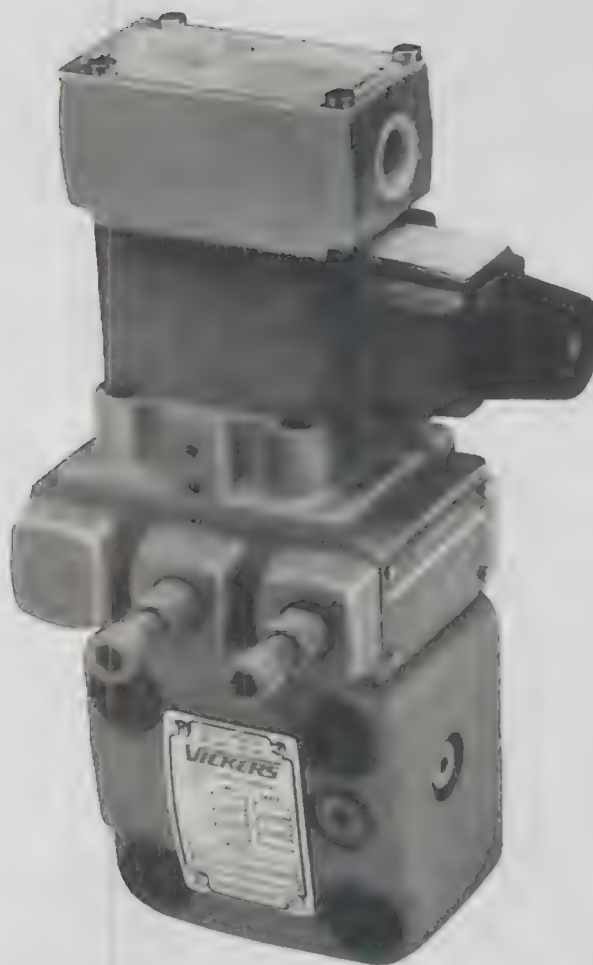
NOTE: USE EITHER A LO-VENT OR HI-VENT SPRING. DO NOT USE BOTH. (SEE MODEL CODE)

MODEL	COVER SPRING	PRESSURE RANGE PSI (bar)
C*-**-B	2280	125-1000 (8.5-70)
C*-**-C	583937	500-2000 (35-140)
C*-**-F	2281	1500-3000 (105-210)

Service Parts Information

**Multi-
Pressure
Relief
Valve**

CG/CS/CT-06-**-*(*)-(V)-DG8BL-M(***)-M-**-**-30
CG/CS/CT-10-**-*(*)-(V)-DG8BL-M(***)-M-**-**-30



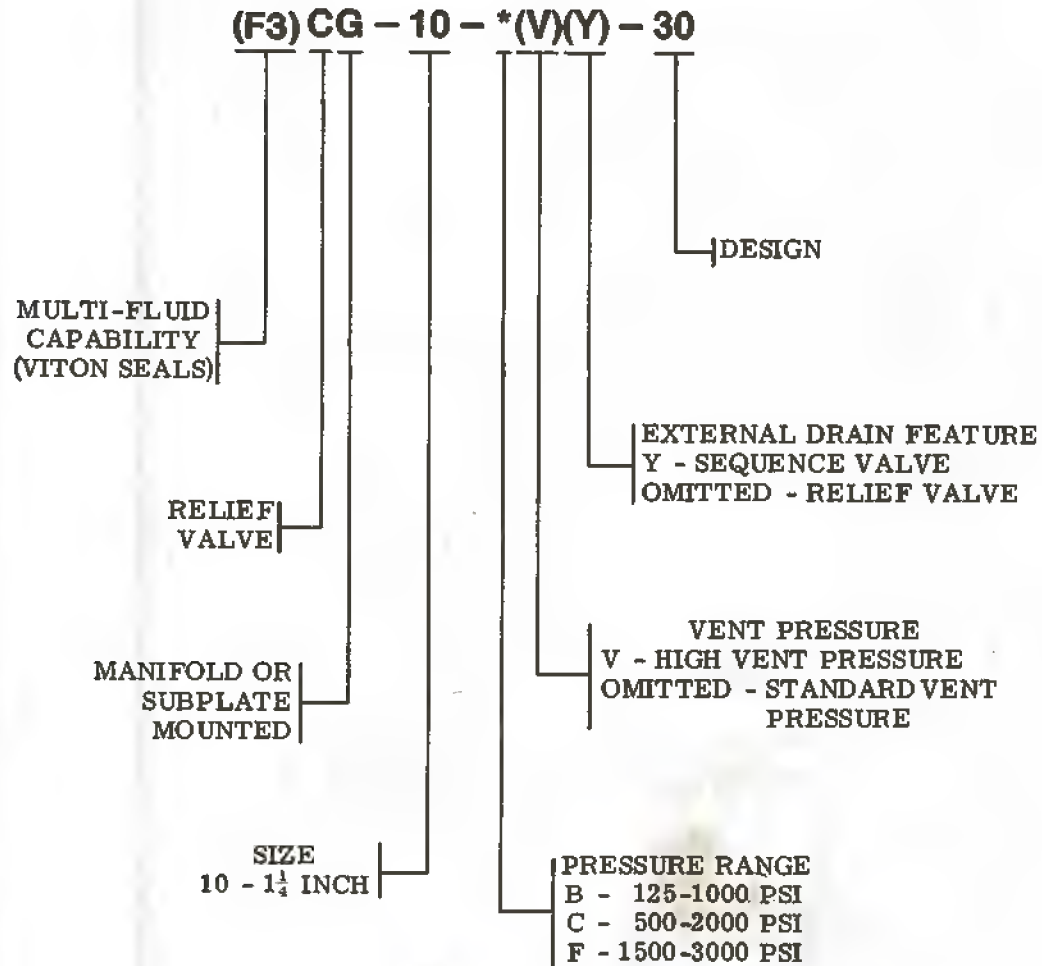
Vickers, Incorporated

P.O. Box 302
Troy, Michigan 48007-0302

Released 8-1-86

I-3694-S

MODEL CODE BREAKDOWN



For satisfactory service life of these components in industrial applications, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from Vickers OFP, OFR, and OFRS series are recommended.

Litho in U. S. A.

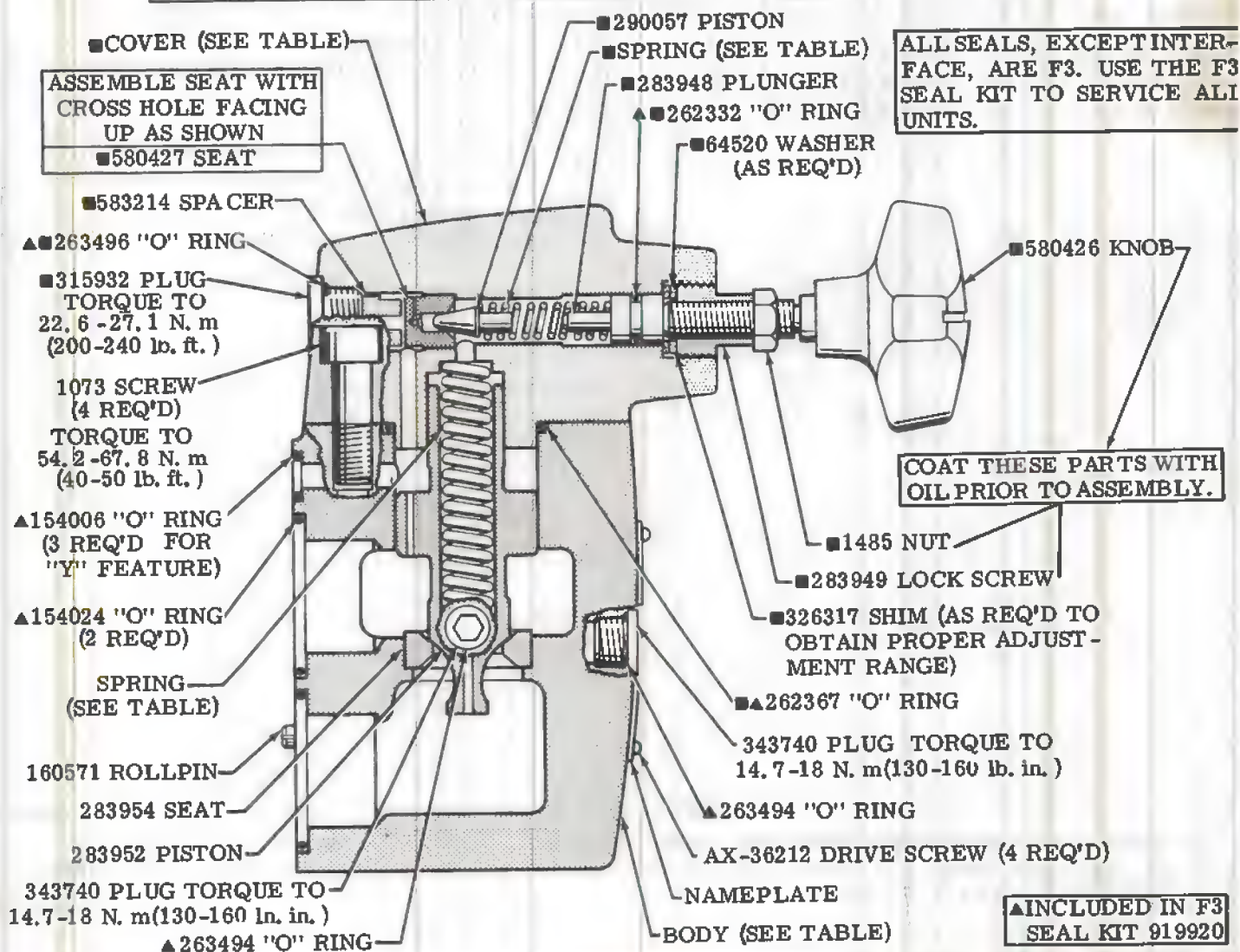
Service Parts Information

VICKERS.
A TRIMONA COMPANY

BALANCED PISTON TYPE SEQUENCE & RELIEF VALVES

CG-10-***-30

MODEL	COVER	BODY	SPRING	SPRING	PRESSURE RANGE PSI	INCLUDED IN COVER S/A
CG-10-B-30	581700	581703	291822	2280	125-1000	941286
CG-10-BV-30			291821			
CG-10-BVY-30	590299	591450	291822			—
CG-10-BY-30			291822	583937	500-2000	941287
CG-10-C-30	581700	581703	291821			
CG-10-CV-30			291821			—
CG-10-CVY-30	590299	591450	291822	2281	1500-3000	941288
CG-10-CY-30			291822			
CG-10-F-30	581700	581703	291821			—
CG-10-FV-30			291821	590299	591450	291822
CG-10-FVY-30			291822			
CG-10-FY-30			291822			

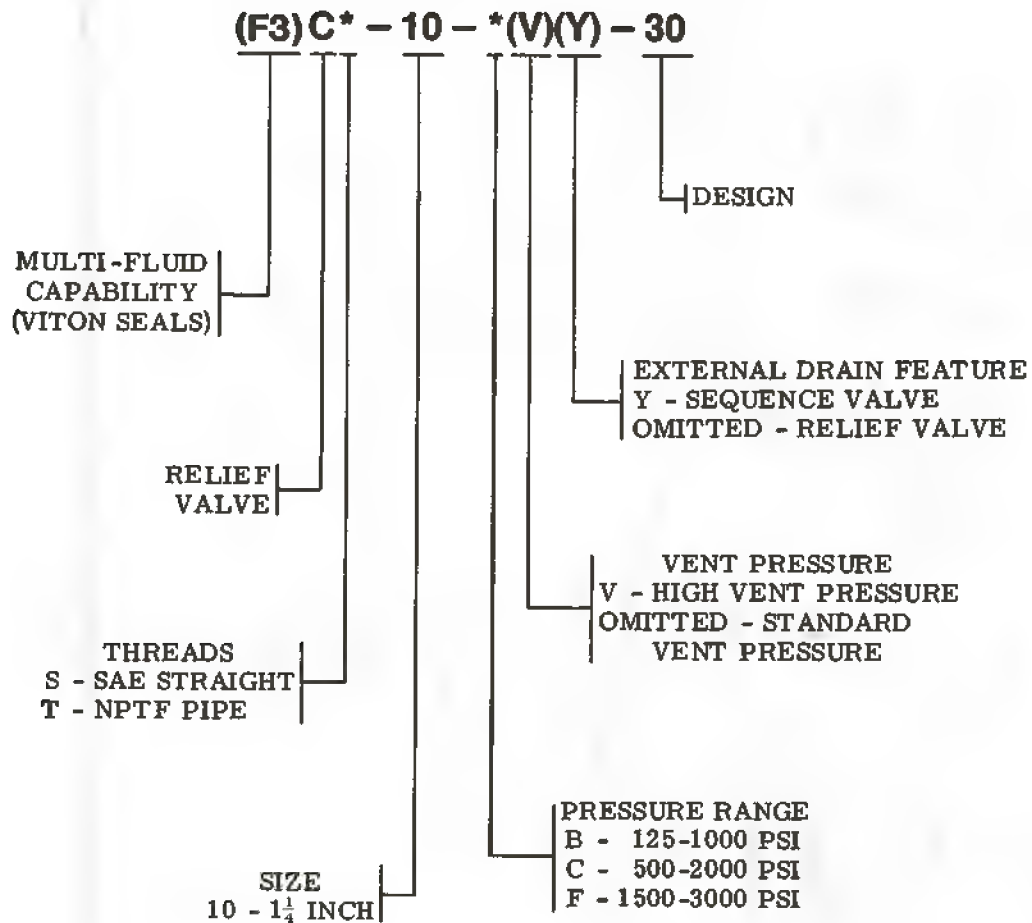


Vickers, Incorporated
P.O. Box 302
Troy, Michigan 48007-0302

Revised 7-1-85

1-3697-S

MODEL CODE BREAKDOWN



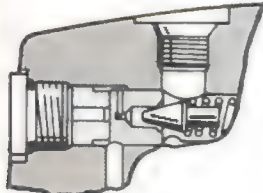
For satisfactory service life of these components, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from Vickers OFF, OFR, and OFRS series are recommended.

Service Parts Information

BALANCED PISTON TYPE RELIEF VALVES

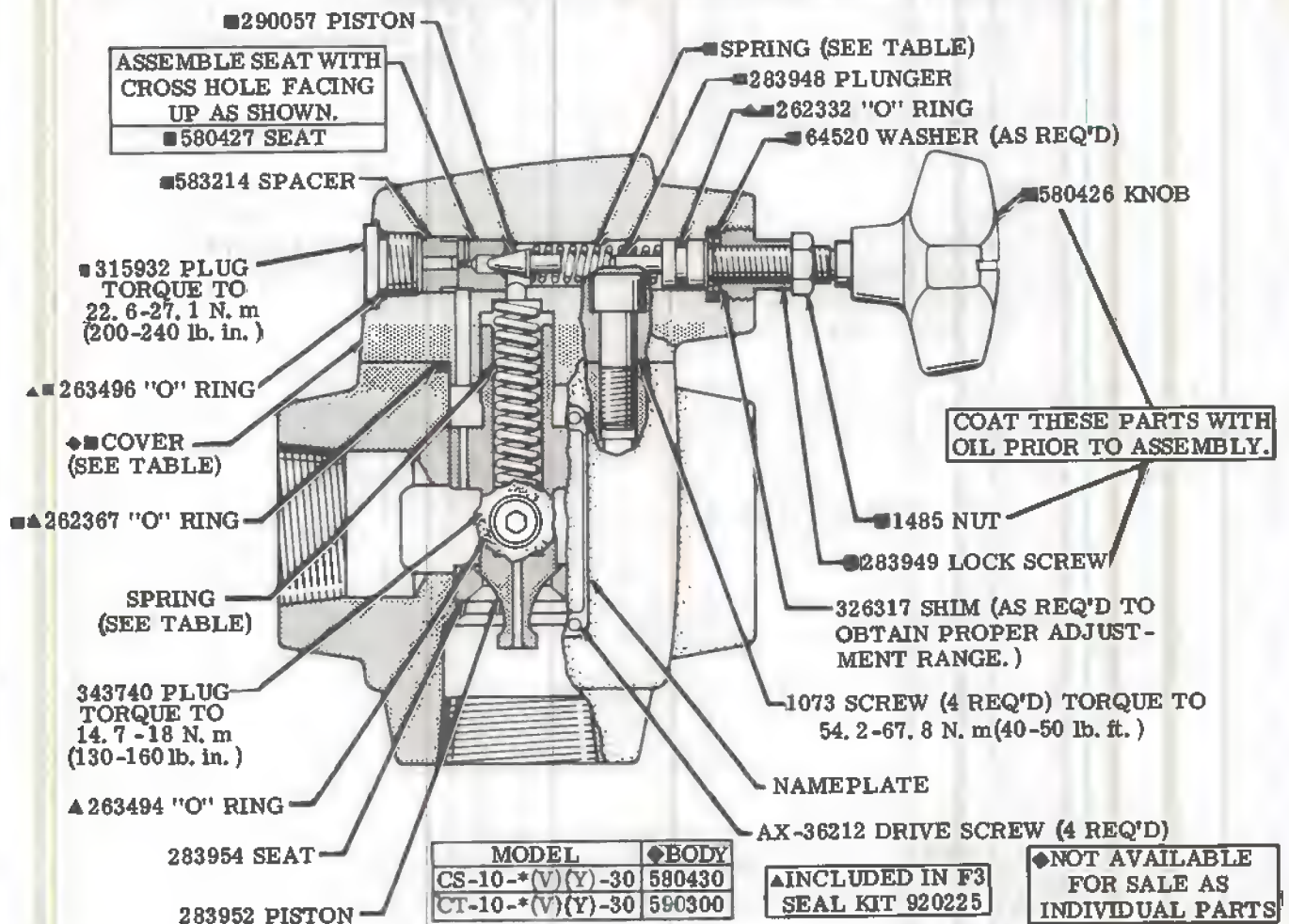
(F3)C*-10-*(V)(Y)-30

VICKERS
A TRIDOVA COMPANY



"Y" COVER ASSEMBLY
(SEE TABLE)

MODEL	COVER	SPRING	SPRING	PRESSURE RANGE PSI	INCLUDED IN COVER S/A
C*-10-B-30	581700	291822	2280	125-1000	941286
C*-10-BV-30		291821			—
C*-10-BVY-30	590304	291822	583937	500-2000	941287
C*-10-BY-30		291821			—
C*-10-C-30	581700	291822	2281	1500-3000	941288
C*-10-CV-30	590304	291821			926596
C*-10-CVY-30		291822			
C*-10-CY-30	581700	291821			
C*-10-F-30	590304	291822			
C*-10-FV-30		291821			
C*-10-FVY-30		291822			
C*-10-FY-30		291822			

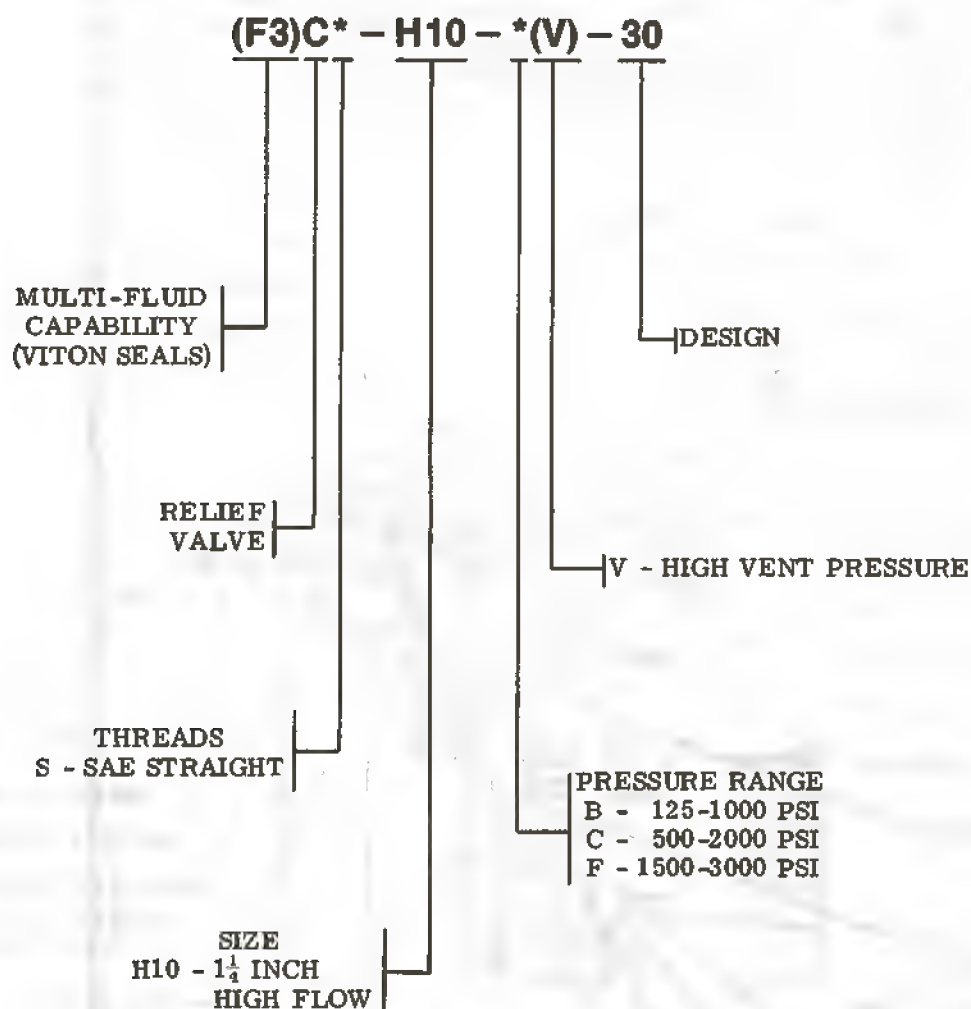


MODEL	BODY
CS-10-*(V)(Y)-30	580430
CT-10-*(V)(Y)-30	590300

INCLUDED IN F3
SEAL KIT 920225

NOT AVAILABLE
FOR SALE AS
INDIVIDUAL PARTS

MODEL CODE BREAKDOWN



For satisfactory service life of these components in industrial applications, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from Vickers OFP, OFR, and OFRS series are recommended.

Service Parts Information

**BALANCED PISTON
TYPE HIGH FLOW
RELIEF VALVES**

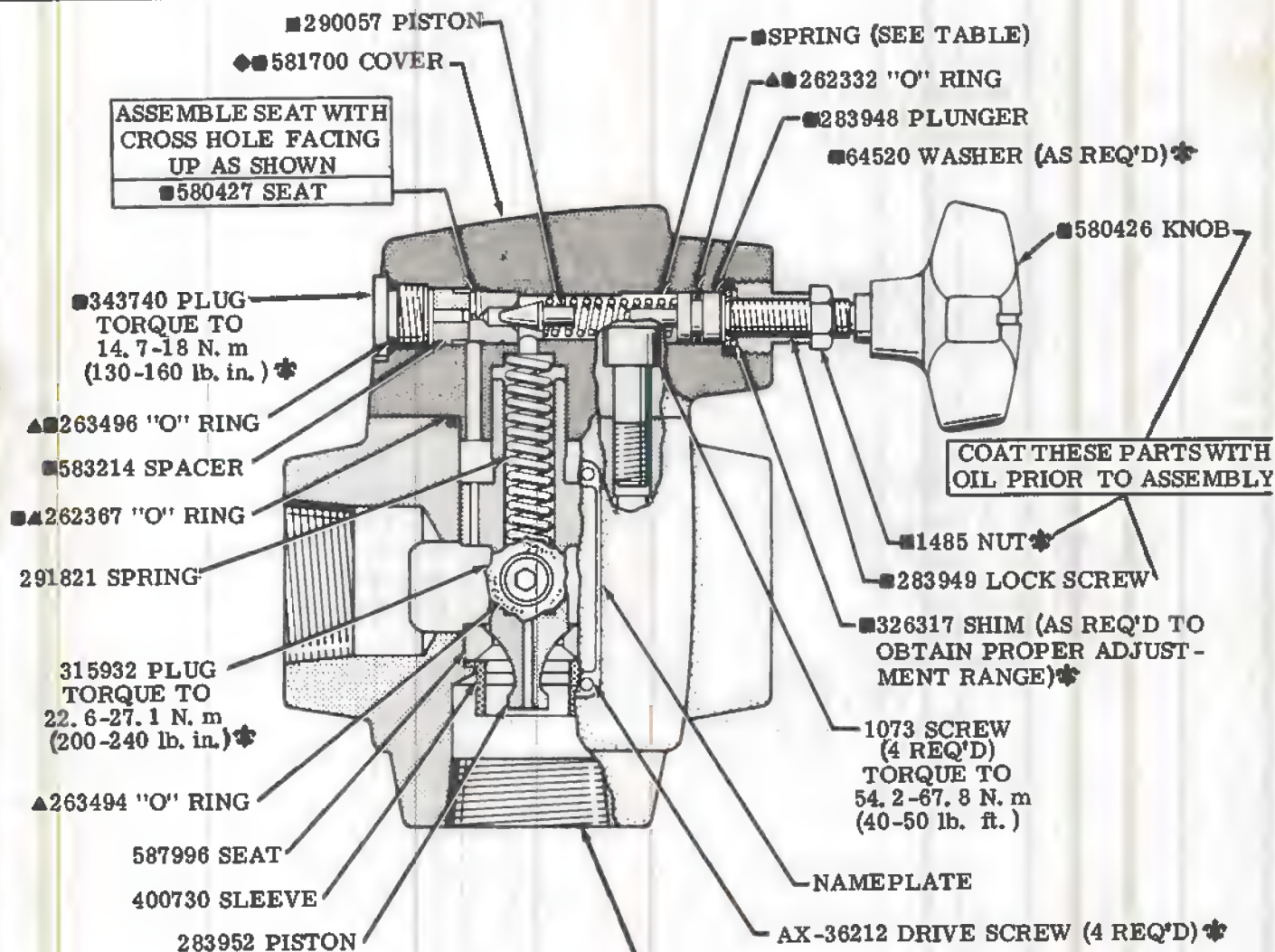
(F3)CS-H10-*(V)-30

VICKERS.

A TRIMONA COMPANY

AVAILABLE IN LOT KITS OF 25 PCS.✱	
1485	944064
36212	944053
64520	944068
326317	944073
343740	944038
315932	944062

MODEL	SPRING	PRESSURE RANGE PSI	INCLUDED IN COVER S/A
C*-H10-BV-30	2280	125-1000	941286
C*-H10-CV-30	583937	500-2000	941287
C*-H10-FV-30	2281	1500-3000	941288



▲ SERVICE ALL UNITS
W/F3 SEAL KIT 920225

MODEL	BODY
CS-H10-*V-30	580430

◆ NOT AVAILABLE FOR
SALE AS INDIVIDUAL PART

Vickers, Incorporated
P.O. Box 302
Troy, Michigan 48007-0302

Revised 8-1-87

I-3699-S

MODEL CODE BREAKDOWN

(F3) - C * 19 - (H) 10 * * (P) - * (V) - (***) - 90
 1 2 3 4 5 6 7 8 9 10 11 12 13

1 Seals for Mineral Oil
& Fire Resistant Fluids
(Omit if not Required)

2 Relief Valve

3 Connections
 G - Subplate Mounting
 S - Straight Threads
 T - NPTF Threads

4 Air Controlled, Pilot Operated

5 High Flow
 CG & CS Models Only
 (Omit if not Required)

6 Valve Size
 1 1/4 inch

7 Pilot Valve Spool Type

8 Pilot Valve Function

A - Spring Offset (Single Operator)
 B - Spring Centered (Operator 'A'
 Removed)
 C - Spring Centered (Dual Operator)
 F - Spring Offset (Pressurize to Center)

9 Manual Operator Option in End Cap
for Single Operator Models Only
(Omit if not Required)

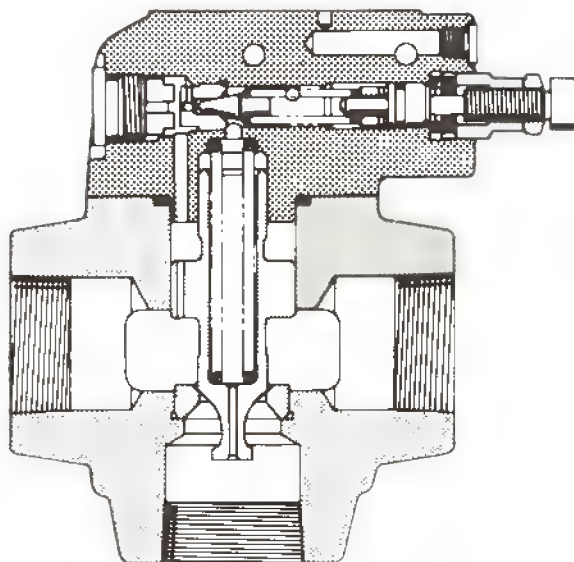
10 Pressure Range

B - 125-1000 psi
 C - 500-2000 psi
 F - 1500-3000 psi

11 High Vent
 (Omit if not Required)

12 Pilot Valve Port Orifices
 (Omit if not Required)

13 Design



RELIEF VALVE SECTIONAL VIEW WITHOUT PILOT VALVE

For satisfactory service life of these components in industrial applications, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from Vickers OFP, OFR and OFRS filter series are recommended.

Litho in U.S.A.

MODEL	DIAGRAM PLATE	PILOT VALVE	PILOT VALVE PARTS DRWG.
C*19-(H)060A(P)-*(V)-90	422864	DG18V-3-0BL-40	1-3616-S
C*19-(H)061A(P)-*(V)-90	422865	DG18V-3-2AL-40	
C*19-(H)062A(P)-*(V)-90	423814	DG18V-3-2BL-40	
C*19-(H)060C-*(V)-90	422862	DG18V-3-0C-40	
C*19-(H)062C-*(V)-90	422863	DG18V-3-2C-40	
C*19-(H)060F(P)-*(V)-90	—	DG18V-3-0FL-40	

MODEL	■ COVER S/A
C*19-(H)060A/F-B(V)-90	942432
C*19-(H)060A/F-C(V)-90	942433
C*19-(H)060A/F-F(V)-90	942434
C*19-(H)061A-B(V)-90	942435
C*19-(H)062A-B(V)-90	
C*19-(H)06*C-B(V)-90	
C*19-(H)061A-C(V)-90	942436
C*19-(H)062A-C(V)-90	
C*19-(H)06*C-C(V)-90	
C*19-(H)061A-F(V)-90	942437
C*19-(H)062A-F(V)-90	
C*19-(H)06*C-F(V)-90	

MODEL	■ COVER	■ PLUG/'O'RING (2 REQ'D)	■ PLUG/'O'RING
C*19-(H)060A-90	422828	—	—
C*19-(H)061A-90	424203	343740/ ▲ 263494	398071/ ▲ 263492
C*19-(H)062A-90			
C*19-(H)06*C-90			

NOTE
PARTS PREFIXED WITH A SYMBOL
ARE AVAILABLE ONLY IN KITS.

- INCLUDED IN COVER S/A
- ▲ INCLUDED IN F3 SEAL KIT 920345
(INCLUDES PILOT VALVE SEALS)
- ⊕ LUBRICATE WITH OIL BEFORE ASSEMBLY
- ◆ NOT AVAILABLE FOR SALE

◆ BODY (SEE TABLE)

AX-36212 SCREW
(4 REQ'D)

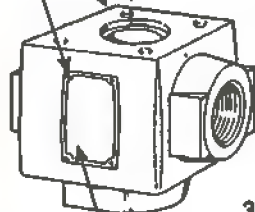


DIAGRAM PLATE
(SEE TABLE)

343740 PLUG
TORQUE 15.0-16.6 N.m
(133-147 lb. in.)

◆ BODY	MODEL
590407	CS19-03**-*-90
581701	CS19-(H)06**-*-*(V)-90
590348	CT19-06**-*-90

▲ 263494 'O'RING

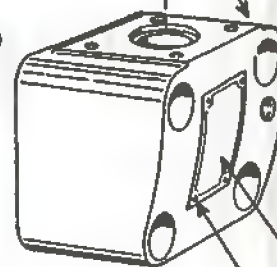


▲ 262332 'O'RING



160571 PIN

▲ 262395 'O'RING
(2 REQ'D)



343740 PLUG
TORQUE 15.0-16.6 N.m
(133-147 lb. in.)

▲ 263494 'O'RING

DIAGRAM PLATE
(SEE TABLE)

AX-36212 SCREW
(4 REQ'D)

CG19-(H)06**-*-*(V)-90

PILOT VALVE (SEE TABLE)
(DG18V-3-*C-40 SHOWN)

255698 BOLT KIT (INCLUDES 4 BOLTS)
TORQUE 5.6 N.m (50 lb. in.) MAXIMUM

68905 WASHER (4 REQ'D)

NOTE
ROTATE PILOT VALVE AND COVER S/A
90° CLOCKWISE FOR DUAL OPERATOR
CG19 MODELS.

▲ 232332 'O'RING
(4 REQ'D)

1031 SCREW (4 REQ'D)
TORQUE 14.5-20.4 N.m
(11-15 lb. ft.)

COVER (SEE TABLE)

■ 285601 SEAT
■ ▲ 263497 'O'RING
■ 329463 PLUG
TORQUE
53-58 N.m
(39-43 lb. ft.)

■ 343740 263494
PLUG & 'O'RING
(2 REQ'D) (SEE TABLE)
■ 398071 263492
PLUG & 'O'RING
(SEE TABLE)
■ 326317 SHIM
(As req'd to obtain
proper adj. range)
⊖ ■ 292230 SCREW
■ 1485 LOCKNUT
⊖ ■ 283949 RETAINER
■ 64520 WASHER
■ 283948 PLUNGER
■ ▲ 262332 'O'RING
■ WASHER (SEE TABLE)
■ 422849 SPACER
■ COVER SPRING (SEE TABLE)
■ 290057 PISTON

■ ▲ 262361
'O'RING
INNER
SPRING
(SEE TABLE)
OUTER
SPRING
(SEE TABLE)
343154
PISTON

Assemble 285601 seat
with cross hole facing
up as shown.

SEAT (SEE TABLE)
SLEEVE ('H' HIGH
FLOW MODELS ONLY)
(SEE TABLE)

MODEL	SEAT	SLEEVE
C*19-03/06	343153	—
C*19-H06	589473	589472

MODEL	WASHER	INNER SPRING	OUTER SPRING	COVER SPRING
C*19-06** -B-90	—	2077	—	—
C*19-H06** -BV-90	—	—	184458	2280
C*19-06** -C-90	233110	2077	—	—
C*19-H06** -CV-90	—	—	184458	583937
C*19-06** -F-90	—	2077	—	—
C*19-H06** -FV-90	—	—	184458	2281

VICKERS.

A TRIMOVA COMPANY

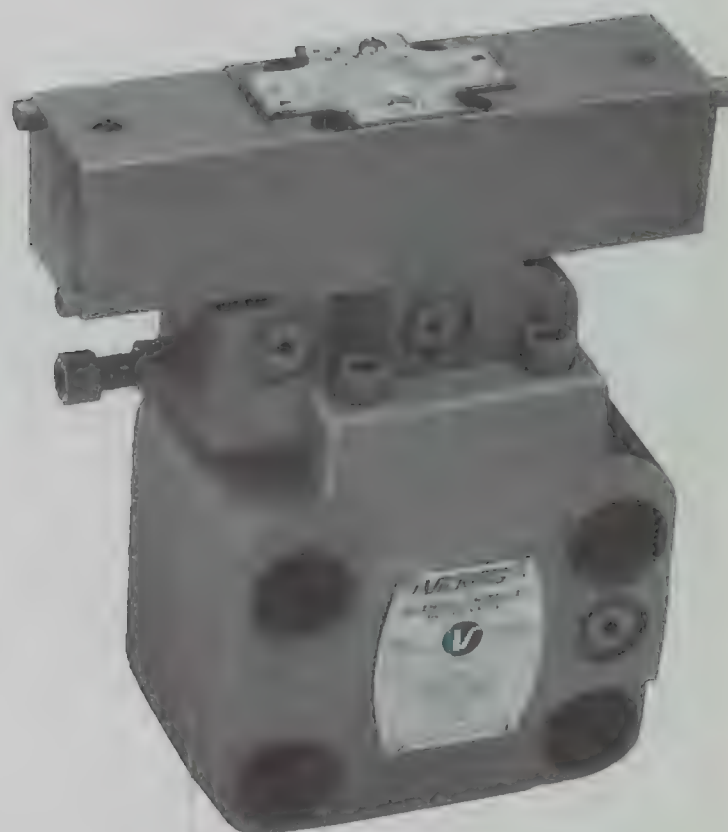
Service Parts Information

AIR CONTROLLED
RELIEF VALVES

(F3)-CG19-(H)10**(P)-*(V)-(***)-90

(F3)-CS19-(H)10**(P)-*(V)-(***)-90

(F3)-CT19-10**(P)-*-(***)-90



Vickers, Incorporated

1401 Crooks Road
Troy, Michigan 48064

Released 9-1-87

I-3429-S

MODEL CODE BREAKDOWN

(F3) - C * 19 - (H) ** * * (P) - * (V) - (***) - 90
 1 2 3 4 5 6 7 8 9 10 11 12 13

1 Seals for Mineral Oil
& Fire Resistant Fluids
(Omit if not Required)

2 Relief Valve

3 Connections
 G - Subplate Mounting
 S - Straight Threads
 T - NPTF Threads

4 Air Controlled, Pilot Operated

5 High Flow
 CG & CS Models Only
 (Omit if not Required)

6 Valve Size
 03 - 3/8 inch
 06 - 3/4 inch

7 Pilot Valve Spool Type

8 Pilot Valve Function

A - Spring Offset (Single Operator)
 B - Spring Centered (Operator 'A'
 Removed)
 C - Spring Centered (Dual Operator)
 F - Spring Offset (Single Operator)
 (Pressurize to Center)

9 Manual Operator Option in End Cap
for Single Operator Models Only
 (Omit if not Required)

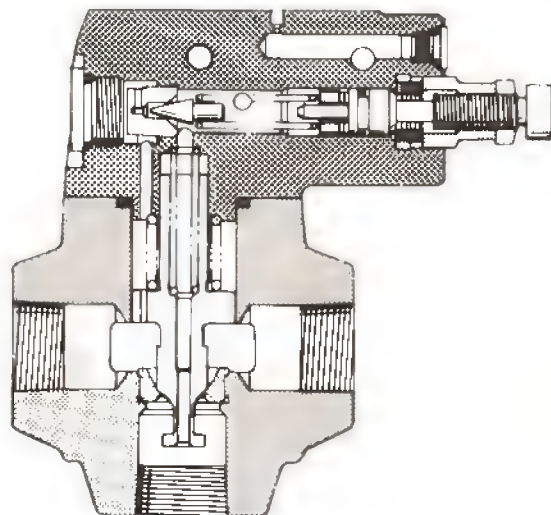
10 Pressure Range

B - 125-1000 psi
 C - 500-2000 psi
 F - 1500-3000 psi

11 High Vent
 (Omit if not Required)

12 Pilot Valve Port Orifices
 (Omit if not Required)

13 Design



RELIEF VALVE SECTIONAL VIEW WITHOUT PILOT VALVE

For satisfactory service life of these components in industrial applications, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from Vickers OFP, OFR and OFRS filter series are recommended.

Litho in U.S.A.

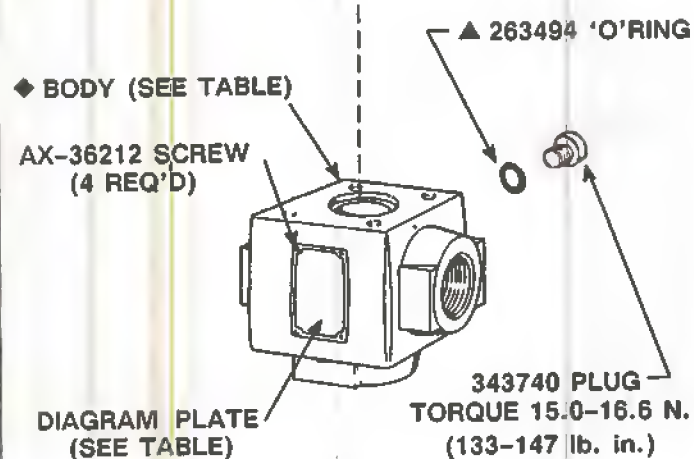
MODEL	DIAGRAM PLATE	PILOT VALVE	PILOT VALVE PARTS DRWG.
C*19-(H)100A(P)-*(V)-90	422864	DG18V-3-0BL-**-40	I-3616-S
C*19-(H)101A(P)-*(V)-90	422865	DG18V-3-2AL-**-40	
C*19-(H)102A(P)-*(V)-90	423814	DG18V-3-2BL-**-40	
C*19-(H)100C-*(V)-90	422862	DG18V-3-0C-**-40	
C*19-(H)102C-*(V)-90	422863	DG18V-3-2C-**-40	
C*19-(H)100F(P)-*(V)-90	—	DG18V-3-0FL-**-40	

MODEL	■ COVER S/A
C*19-(H)100A/F-B(V)-90	942456
C*19-(H)100A/F-C(V)-90	942457
C*19-(H)100A/F-F(V)-90	942458
C*19-(H)101A-B(V)-90	942459
C*19-(H)102A-B(V)-90	
C*19-(H)10*C-B(V)-90	
C*19-(H)101A-C(V)-90	
C*19-(H)102A-C(V)-90	942460
C*19-(H)10*C-C(V)-90	
C*19-(H)101A-F(V)-90	
C*19-(H)102A-F(V)-90	942461
C*19-(H)10*C-F(V)-90	

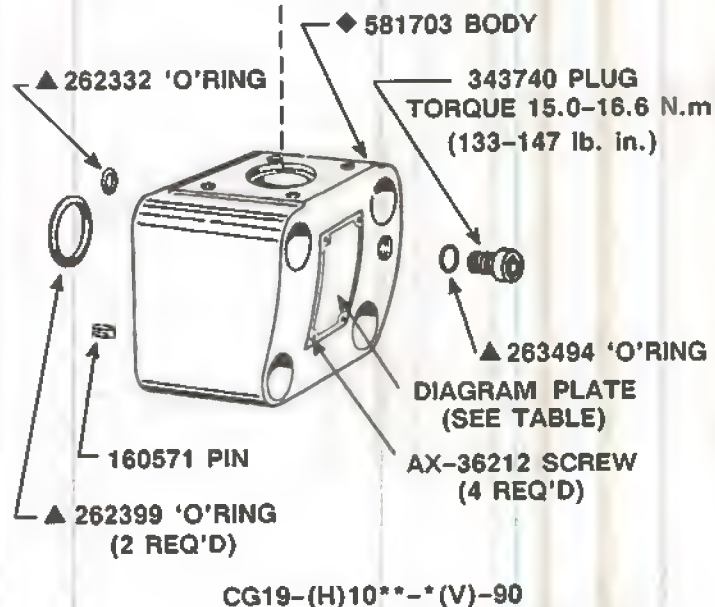
MODEL	■ COVER	■ PLUG/'O'RING (2 REQ'D)	■ PLUG/'O'RING
C*19-(H)100A-90	422852	—	—
C*19-(H)101A-90	424204	343740/ ▲ 263494	398071/ ▲ 263492
C*19-(H)102A-90			
C*19-(H)10*C-90	—	—	—

NOTE
PARTS PREFIXED WITH A SYMBOL
ARE AVAILABLE ONLY IN KITS.

- INCLUDED IN COVER S/A
- ▲ INCLUDED IN F3 SEAL KIT 920346
(INCLUDES PILOT VALVE SEALS)
- ⊕ LUBRICATE WITH OIL BEFORE ASSEMBLY
- ◆ NOT AVAILABLE FOR SALE



◆ BODY	MODEL
580430	CS19-(H)10**-*(V)-90
590300	CT19-10**-*(V)-90



PILOT VALVE (SEE TABLE)
(DG18V-3-*C--**--40 SHOWN)

255698 BOLT KIT (INCLUDES 4 BOLTS)
TORQUE 5.6 N.m (50 lb. in.) MAXIMUM

68905 WASHER (4 REQ'D)

NOTE
ROTATE PILOT VALVE AND COVER S/A
90° CLOCKWISE FOR DUAL OPERATOR
CG19 MODELS.

▲ 232332 'O'RING
(4 REQ'D)

■ 285601 SEAT

■ 294656 RESTRICTION PLUG

■▲ 263497 'O'RING

■ 329463 PLUG
TORQUE
53-58 N.m
(39-43 lb. ft.)

1074 SCREW (4 REQ'D)
TORQUE 54.2-67.7 N.m
(40-50 lb. in.)

■ COVER (SEE TABLE)

■ 343740 263494
PLUG & 'O'RING
(2 REQ'D) (SEE TABLE)

■ 398071 263492
PLUG & 'O'RING
(SEE TABLE)

■ 326317 SHIM
(As req'd to obtain
proper adj. range)

⊖ ■ 292230 SCREW

■▲ 262367
'O'RING

SPRING
(SEE TABLE)

283952
PISTON

SEAT (SEE TABLE)

SLEEVE ('H' HIGH
FLOW MODELS ONLY)
(SEE TABLE)

Assemble 285601 seat
with cross hole facing
up as shown.

■ 1485 LOCKNUT
⊖ ■ 283949 RETAINER

■ 64520 WASHER

■ 283948 PLUNGER

■▲ 262332 'O'RING

■ WASHER (SEE TABLE)

■ 422849 SPACER

■ COVER SPRING (SEE TABLE)

■ 290057 PISTON

MODEL	SEAT	SLEEVE
C*19-10	283954	—
C*19-H10	587996	400730

MODEL	■ WASHER	■ COVER SPRING	SPRING
C*19-10**-B-90	—	2280	291822
C*19-H10**-BV-90	—	—	291821
C*19-10**-C-90	233110	583937	291822
C*19-H10**-CV-90	—	—	291821
C*19-10**-F-90	—	2281	291822
C*19-H10**-FV-90	—	—	291821

VICKERS.

A TRIMONA COMPANY

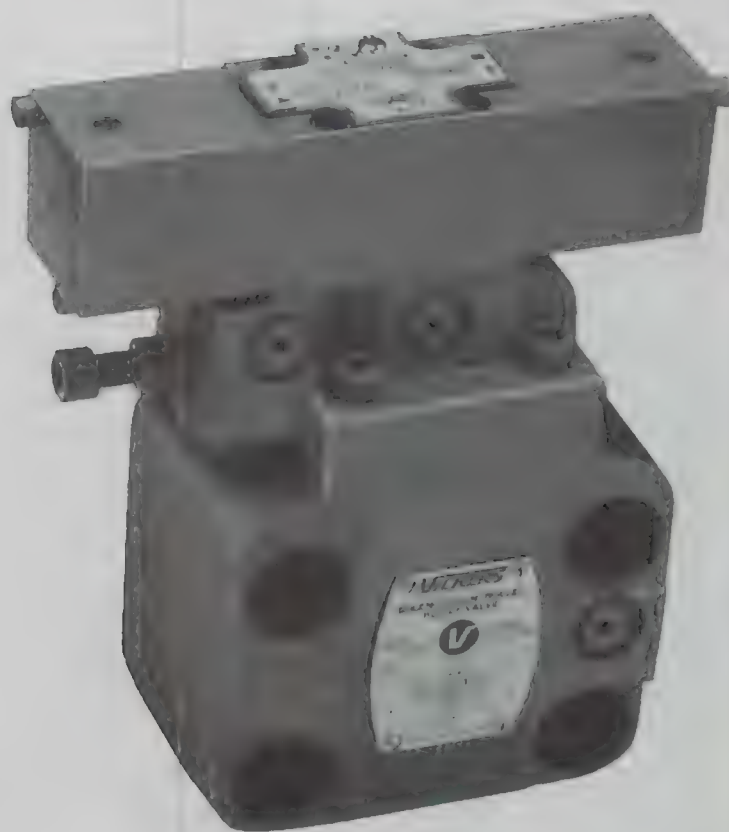
Service Parts Information

AIR CONTROLLED
RELIEF VALVES

(F3)-CG19-(H)06**(P)-*(V)-(***)-90

(F3)-CS19-(H)03/06**(P)-*(V)-(***)-90

(F3)-CT19-06**(P)-*-(***)-90



Vickers, Incorporated

1401 Crooks Road
Troy, Michigan 48064

Released 9-1-87

I-3428-S

MODEL CODE BREAKDOWN

(F3) - C * 5 - (H) 10 * * (L) (P) - * (V) - M - **** - 90

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
---	---	---	---	---	---	---	---	---	----	----	----	----	----	----

1 Seals for Mineral Oil
 & Fire Resistant Fluids
 (Omit if not Required)

2 Relief Valve

3 Connections

G - Subplate Mounting
S - Straight Threads
T - NPTF Threads

4 Solenoid Controlled

5 High Flow
 CG5 or CS5 Models Only
 (Omit if not Required)

6 Valve Size
 1 1/4 inch

7 Pilot Valve Spool Type

8 Pilot Valve Function

A - Spring Offset (Single Solenoid)
B - Spring Centered (Sol. 'A' Removed)
C - Spring Centered (Dual Solenoids)
F - Spring Offset (Single Solenoid)
 Energize to Vent

9 Left Hand Built
 Single Solenoid Pilot Valve
 (Omit if not Required)

10 Manual Operator for
 Single Solenoid Pilot Valve
 (Omit if not Required)

11 Pressure Range

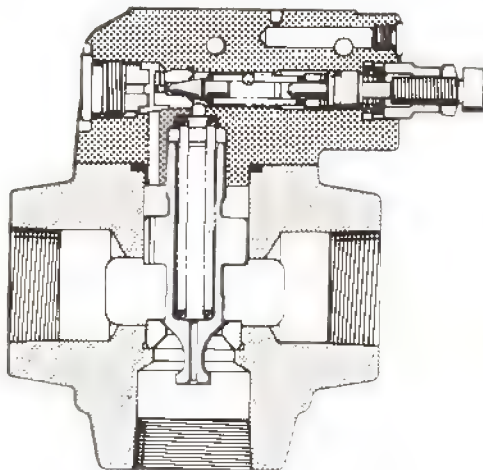
B - 125-1000 psi
C - 500-2000 psi
F - 1500-3000 psi

12 High Vent
 (Omit if not Required)

13 Flag Symbol Heading for
 Pilot Valve Electrical Features

14 Pilot Valve Electrical Features
 (Refer to Drawing I-3866-S
 & Pilot Valve Parts Drawing)

15 Design



RELIEF VALVE SECTIONAL VIEW WITHOUT PILOT VALVE

For satisfactory service life of these components in industrial applications, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from Vickers OFP, OFR and OFRS series filter series are recommended.

Litho in U.S.A

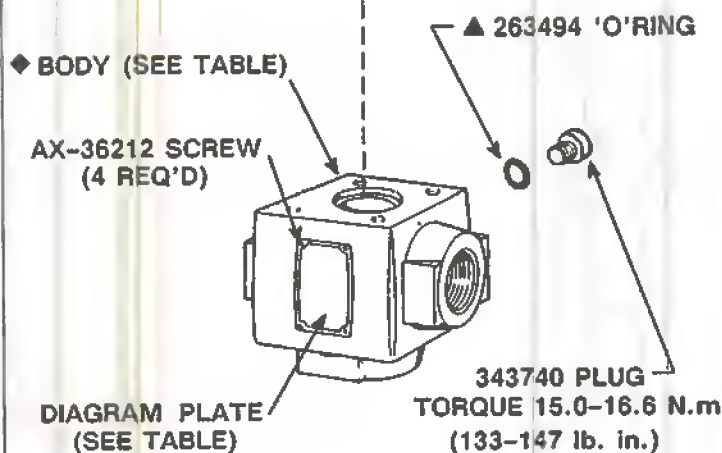
MODEL	DIAGRAM PLATE	PILOT VALVE	PILOT VALVE PARTS DRWG.
C*5 -(H)100A(P)-*(V)-M-***-90	422864	DG4V-3-0BL-M***-40	I-3862-S
C*5 -(H)101A(P)-*(V)-M-***-90	422865	DG4V-3-2AL-M***-40	I-3861-S
C*5 -(H)102A(P)-*(V)-M-***-90	423814	DG4V-3-2BL-M***-40	I-3862-S
C*5 -(H)100C-*(V)-M-***-90	422862	DG4V-3-0C-M***-40	I-3863-S
C*5 -(H)102C-*(V)-M-***-90	422863	DG4V-3-2C-M***-40	I-3863-S
C*5 -(H)100F(P)-*(V)-M-***-90	—	DG4V-3-0FL-M***-40	I-3864-S

MODEL	■ COVER S/A
C*5-(H)100A/F-B(V)-90	942456
C*5-(H)100A/F-C(V)-90	942457
C*5-(H)100A/F-F(V)-90	942458
C*5-(H)101A-B(V)-90	942459
C*5-(H)102A-B(V)-90	
C*5-(H)10*C-B(V)-90	
C*5-(H)101A-C(V)-90	
C*5-(H)102A-C(V)-90	942460
C*5-(H)10*C-C(V)-90	
C*5-(H)101A-F(V)-90	
C*5-(H)102A-F(V)-90	942461
C*5-(H)10*C-F(V)-90	

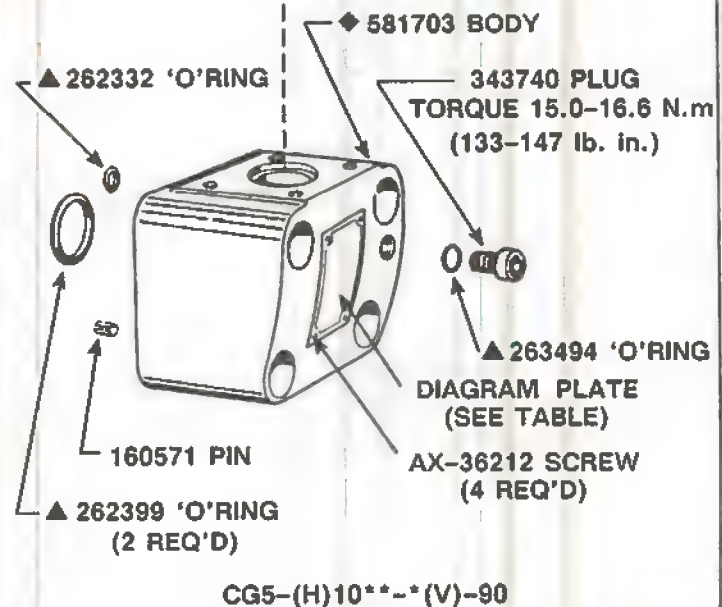
MODEL	■ COVER	■ PLUG/'O'RING (2 REQ'D)	■ PLUG/'O'RING
C*5-(H)100A-90	422852	—	—
C*5-(H)101A-90	424204	343740/ ▲ 263494	398071/ ▲ 263492
C*5-(H)102A-90			
C*5-(H)10*C-90			

NOTE
PARTS PREFIXED WITH A SYMBOL
AVAILABLE ONLY IN KITS.

- INCLUDED IN COVER S/A
- ▲ INCLUDED IN F3 SEAL KIT 920343
(INCLUDES PILOT VALVE SEALS)
- ⊕ LUBRICATE WITH OIL BEFORE ASSEMBLY
- ◆ NOT AVAILABLE FOR SALE



◆ BODY	MODEL
580430	CS5-(H)10**-(V)-90
590300	CT5-10**-(V)-90



PILOT VALVE (SEE TABLE)
(DG4V-3-*C-M-***-40 SHOWN)

255698 BOLT KIT (INCLUDES 4 BOLTS)
TORQUE 5.6 N.m (50 lb. in.) MAXIMUM

68905 WASHER (4 REQ'D)

NOTE
ON CG5-(H)10*-C*-90 DUAL SOLENOID
MODELS, PILOT VALVE & COVER S/A ARE
ROTATED 90° CLOCKWISE FROM BODY.

▲ 232332 'O'RING
(4 REQ'D)

1074 SCREW (4 REQ'D)
TORQUE 54.2-67.7 N.m
(40-50 lb. in.)

- 285601 SEAT
- 294656 RESTRICTION PLUG
- ▲ 263497 'O'RING
- 329463 PLUG
TORQUE
53-58 N.m
(39-43 lb. ft.)

■ COVER (SEE TABLE)

■ 343740 ▲ 263494
PLUG & 'O'RING
(2 REQ'D) (SEE TABLE)

■ 398071 ▲ 263492
PLUG & 'O'RING
(SEE TABLE)

■ 326317 SHIM
(As req'd to obt
proper adj. rang

⊖ ■ 292230 SCRE

■ ▲ 262367
'O'RING

SPRING
(SEE TABLE)

283952
PISTON

SEAT (SEE TABLE)

SLEEVE ('H' HIGH
FLOW MODELS ONLY)
(SEE TABLE)

Assemble 285601 seat
with cross hole facing
up as shown.

- 1485 LOCKW
- ⊖ ■ 283949 RETAIN
- 64520 WASHER
- 283948 PLUNGER
- ▲ 262332 'O'RING
- WASHER (SEE TABLE)
- 422849 SPACER
- COVER SPRING (SEE TABLE)
- 290057 PISTON

MODEL	SEAT	SLEEVE
C*5-10	283954	—
C*5-H10	587996	400730

MODEL	■ WASHER	■ COVER SPRING	SPRING
C*5-10**-B-90	—	2280	291822
C*5-H10**-BV-90			291821
C*5-10**-C-90	233110	583937	291822
C*5-H10**-CV-90			291821
C*5-10**-F-90	—	2281	291822
C*5-H10**-FV-90			291821

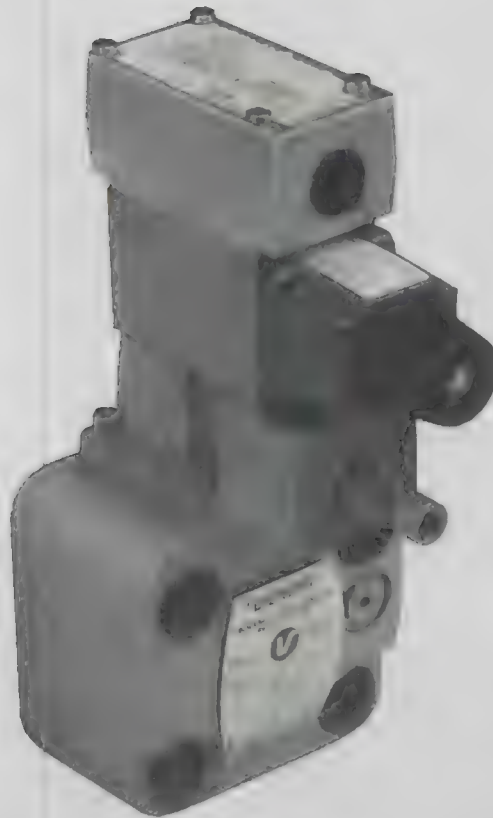
Service Parts Information

SOLENOID
CONTROLLED
RELIEF VALVES

(F3)-CG5-(H) 10** (L) (P) -* (V) -M-****-90

(F3)-CS5-(H) 10** (L) (P) -* (V) -M-****-90

(F3)-CT5-10** (L) (P) -* -M-****-90



Vickers, Incorporated

P.O. Box 302
Troy, Michigan 48007-0302

Released 9-1-87

I-3427-S

MODEL CODE BREAKDOWN

(F3) - C * 5 - (H) ** * * (L) (P) - * (V) - M - **** - 90

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15

1 Seals for Mineral Oil
& Fire Resistant Fluids
(Omit if not Required)

2 Relief Valve

3 Connections

G - Subplate Mounting

S - Straight Threads

T - NPTF Threads

4 Solenoid Controlled

5 High Flow
CG5 or CS5 Models Only
(Omit if not Required)

6 Valve Size
03 - 3/8 inch
06 - 3/4 inch

7 Pilot Valve Spool Type

8 Pilot Valve Function

A - Spring Offset (Single Solenoid)

B - Spring Centered (Sol. 'A' Removed)

C - Spring Centered (Dual Solenoids)

F - Spring Offset (Single Solenoid)

Energize to Vent

9 Left Hand Built
Single Solenoid Pilot Valve
(Omit if not Required)

10 Manual Operator for
Single Solenoid Pilot Valve
(Omit if not Required)

11 Pressure Range

B - 125-1000 psi

C - 500-2000 psi

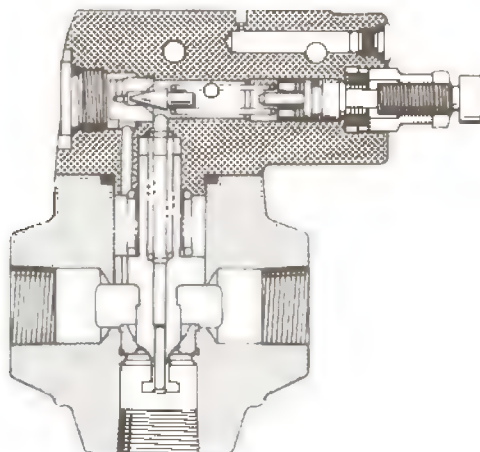
F - 1500-3000 psi

12 High Vent
(Omit if not Required)

13 Flag Symbol Heading for
Pilot Valve Electrical Features

14 Pilot Valve Electrical Features
(Refer to Drawing I-3866-S
& Pilot Valve Parts Drawing)

15 Design



RELIEF VALVE SECTIONAL VIEW WITHOUT PILOT VALVE

For satisfactory service life of these components in industrial applications, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from Vickers OFF, OFR and OFRS filter series are recommended.

Litho in U.S.A.

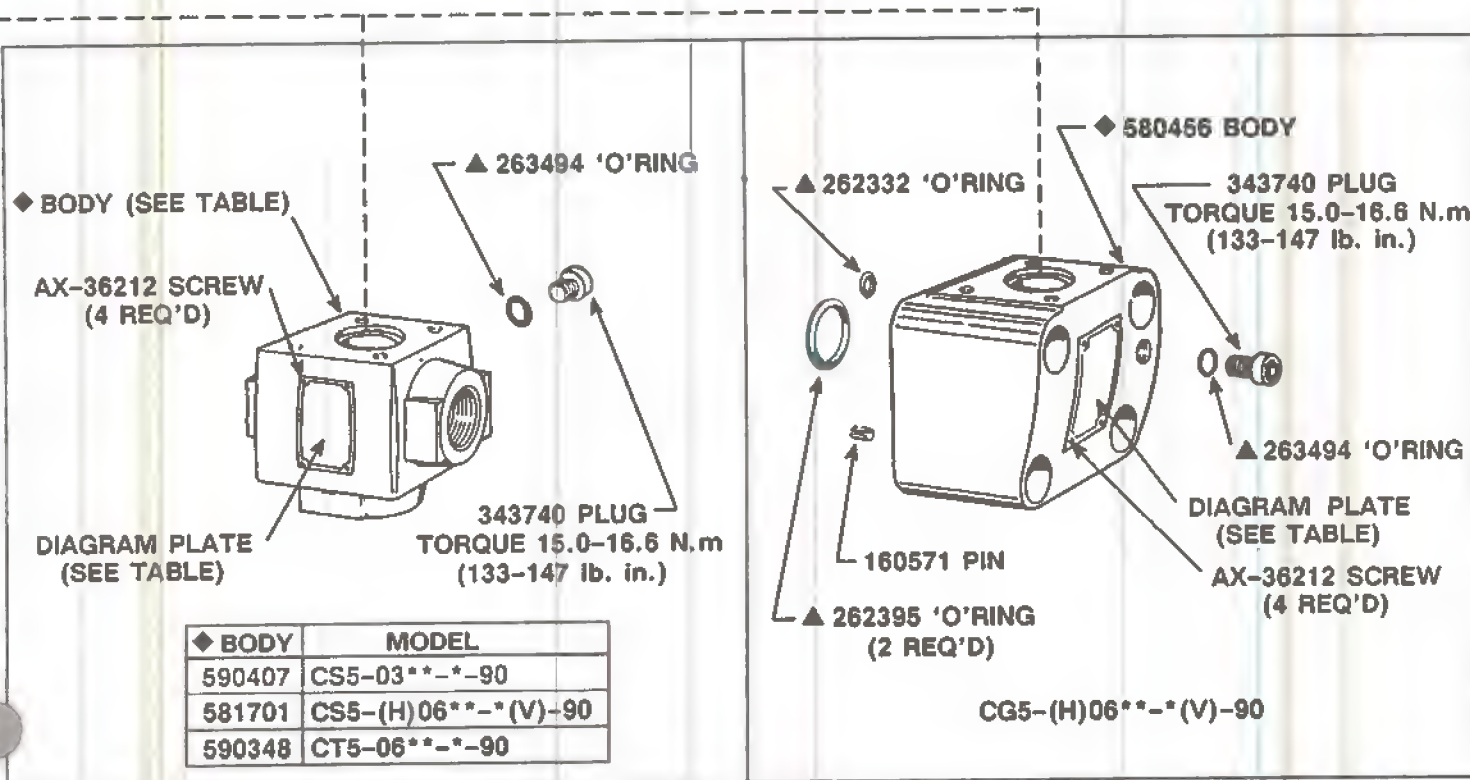
MODEL	DIAGRAM PLATE	PILOT VALVE	PILOT VALVE PARTS DRWG.
C*5-(H)0*0A(P)-*(V)-M***-90	422864	DG4V-3-0BL-M***-40	I-3862-S
C*5-(H)0*1A(P)-*(V)-M***-90	422865	DG4V-3-2AL-M***-40	I-3861-S
C*5-(H)0*2A(P)-*(V)-M***-90	423814	DG4V-3-2BL-M***-40	I-3862-S
C*5-(H)0*0C-*(V)-M***-90	422862	DG4V-3-0C-M***-40	I-3863-S
C*5-(H)0*2C-*(V)-M***-90	422863	DG4V-3-2C-M***-40	I-3863-S
C*5-(H)0*0F(P)-*(V)-M***-90	477211	DG4V-3-0FL-M***-40	I-3864-S

MODEL	■ COVER S/A
C*5-(H)0*0A/F-B(V)-90	942432
C*5-(H)0*0A/F-C(V)-90	942433
C*5-(H)0*0A/F-F(V)-90	942434
C*5-(H)0*1A-B(V)-90	942435
C*5-(H)0*2A-B(V)-90	
C*5-(H)0**C-B(V)-90	
C*5-(H)0*1A-C(V)-90	
C*5-(H)0*2A-C(V)-90	942436
C*5-(H)0**C-C(V)-90	
C*5-(H)0*1A-F(V)-90	942437
C*5-(H)0*2A-F(V)-90	
C*5-(H)0**C-F(V)-90	

MODEL	■ COVER	■ PLUG/'O'RING (2 REQ'D)	■ PLUG/'O'RING
C*5-(H)0*0A-90	422828	—	—
C*5-(H)0*1A-90	424203	343740/ ▲ 263494	398071/ ▲ 263492
C*5-(H)0*2A-90			
C*5-(H)0**C-90			

NOTE
PARTS PREFIXED WITH A SYMBOL
AVAILABLE ONLY IN KITS.

- INCLUDED IN COVER S/A
- ▲ INCLUDED IN F3 SEAL KIT 920344
(INCLUDES PILOT VALVE SEALS)
- ⊖ LUBRICATE WITH OIL BEFORE ASSEMBLY
- ◆ NOT AVAILABLE FOR SALE

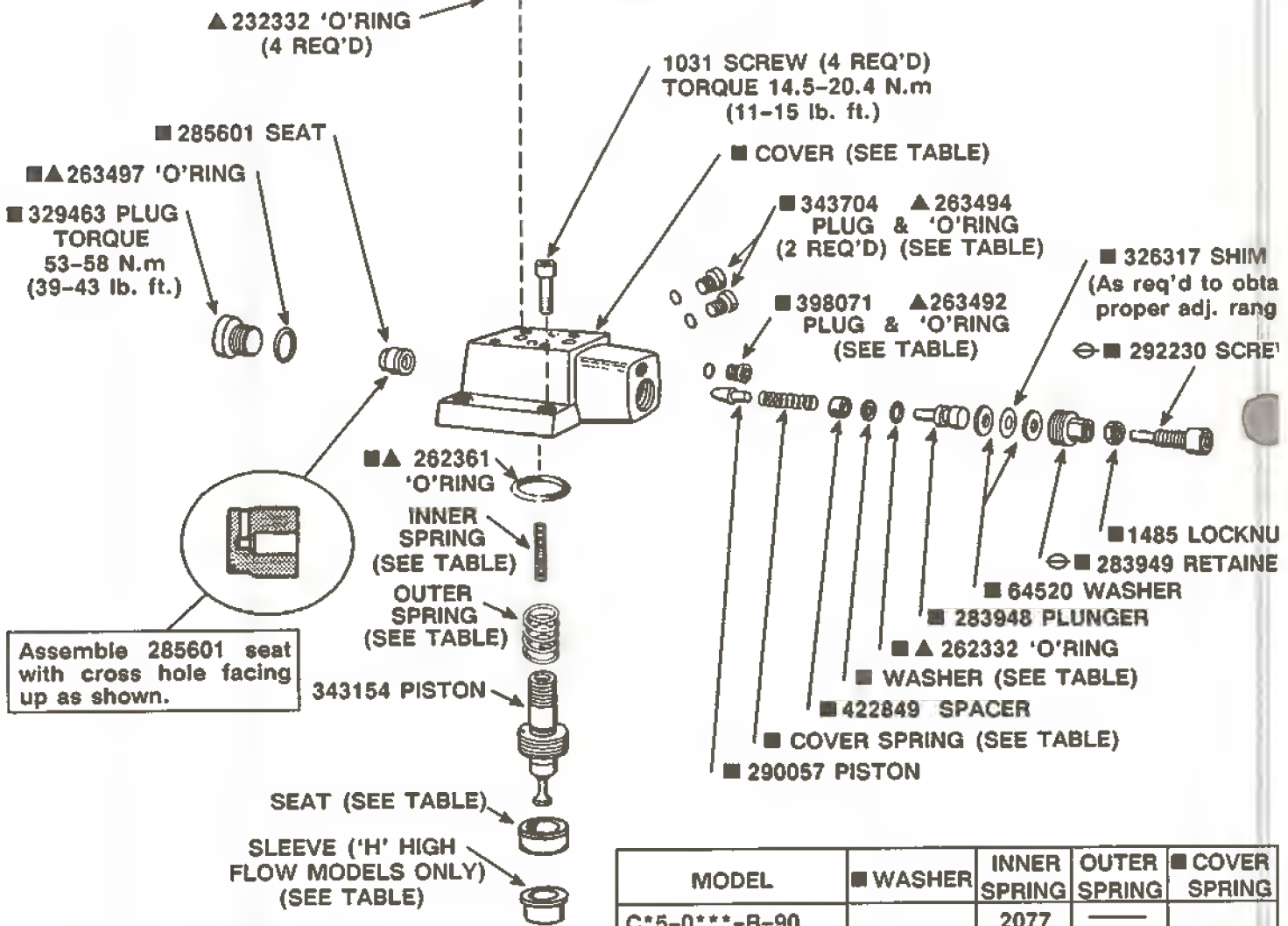


PILOT VALVE (SEE TABLE)
(DG4V-3-*C-M-***-40 SHOWN)

255698 BOLT KIT (INCLUDES 4 BOLTS)
TORQUE 5.6 N.m (50 lb. in.) MAXIMUM

68905 WASHER (4 REQ'D)

NOTE
ON CG5-(H)0***C-*(V)-90 DUAL SOLENOID MODELS, PILOT VALVE & COVER S/A ARE ROTATED 90° CLOCKWISE FROM BODY.



MODEL	SEAT	SLEEVE
C*5-03/06	343153	—
C*5-H06	589473	589472

MODEL	WASHER	INNER SPRING	OUTER SPRING	COVER SPRING
C*5-0***-B-90	—	2077	—	2280
C*5-H0***-BV-90	—	—	184458	—
C*5-0***-C-90	233110	2077	—	583937
C*5-H0***-CV-90	—	—	184458	—
C*5-0***-F-90	—	2077	—	2281
C*5-H0***-FV-90	—	—	184458	—

VICKERS®

A TRIMMOVA COMPANY

Service Parts Information

SOLENOID
CONTROLLED
RELIEF VALVES

(F3)-CG5-(H)06**(L)(P)-*(V)-M-****-90

(F3)-CS5-(H)03/06**(L)(P)-*(V)-M-****-90

(F3)-CT5-06**(L)(P)-*-M-****-90



Vickers, Incorporated

P.O. Box 302
Troy, Michigan 48007-0302

Released 9-1-87

I-3426-S

MODEL CODE BREAKDOWN

(F3) - DGC5 06 0A (P) - * (V) - M (P**) - ** - * - 70

1
2
3
4
5
6
7
8
9
10
11
12

<div style="border: 1px solid black; padding: 2px; display: inline-block; width: 20px; text-align: center;">1</div>	Mineral Oil & Fire Resistant Seals	<div style="border: 1px solid black; padding: 2px; display: inline-block; width: 20px; text-align: center;">7</div>	High Vent Option (Omit if not required)
<div style="border: 1px solid black; padding: 2px; display: inline-block; width: 20px; text-align: center;">2</div>	Solenoid Controlled Relief Valve Module	<div style="border: 1px solid black; padding: 2px; display: inline-block; width: 20px; text-align: center;">8</div>	Flag Symbol Heading for Electrical Features & Options at Pilot Valve
<div style="border: 1px solid black; padding: 2px; display: inline-block; width: 20px; text-align: center;">3</div>	Valve Size (3/4 Inch)	<div style="border: 1px solid black; padding: 2px; display: inline-block; width: 20px; text-align: center;">9</div>	Electrical Features (Refer to drawing I-3866-S)
<div style="border: 1px solid black; padding: 2px; display: inline-block; width: 20px; text-align: center;">4</div>	Pilot Valve Spool Type & Function	<div style="border: 1px solid black; padding: 2px; display: inline-block; width: 20px; text-align: center;">10</div>	Electrical Connector Options U - DIN 43650 W - 1/2" NPT WL - 1/2" NPT with Solenoid Indicator Light
<div style="border: 1px solid black; padding: 2px; display: inline-block; width: 20px; text-align: center;">5</div>	Manual Override in Pilot Valve (Omit if not required)	<div style="border: 1px solid black; padding: 2px; display: inline-block; width: 20px; text-align: center;">11</div>	Coil Voltage I.D. Letter Code (Refer to drawing I-3866-S)
<div style="border: 1px solid black; padding: 2px; display: inline-block; width: 20px; text-align: center;">6</div>	Pressure Range B - 125-1000 PSI C - 500-2000 PSI F - 1500-3000 PSI	<div style="border: 1px solid black; padding: 2px; display: inline-block; width: 20px; text-align: center;">12</div>	Design Number

† AVAILABLE IN LOT KITS OF 25			
ITEM	LOT KIT	ITEM	LOT KIT
1485 NUT	944064	292230 SCREW	944072
36212 SCREW	944053	233110 WASHER	944076
64520 WASHER	944068	326317 WASHER	944073
68905 WASHER	944077	329463 PLUG	944041
199312 PIN	944059	343740 PLUG	944038
		422849 SPACER	944075

For satisfactory service life of these components, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from Vickers OFF, OFR and OFRS filter series are recommended.

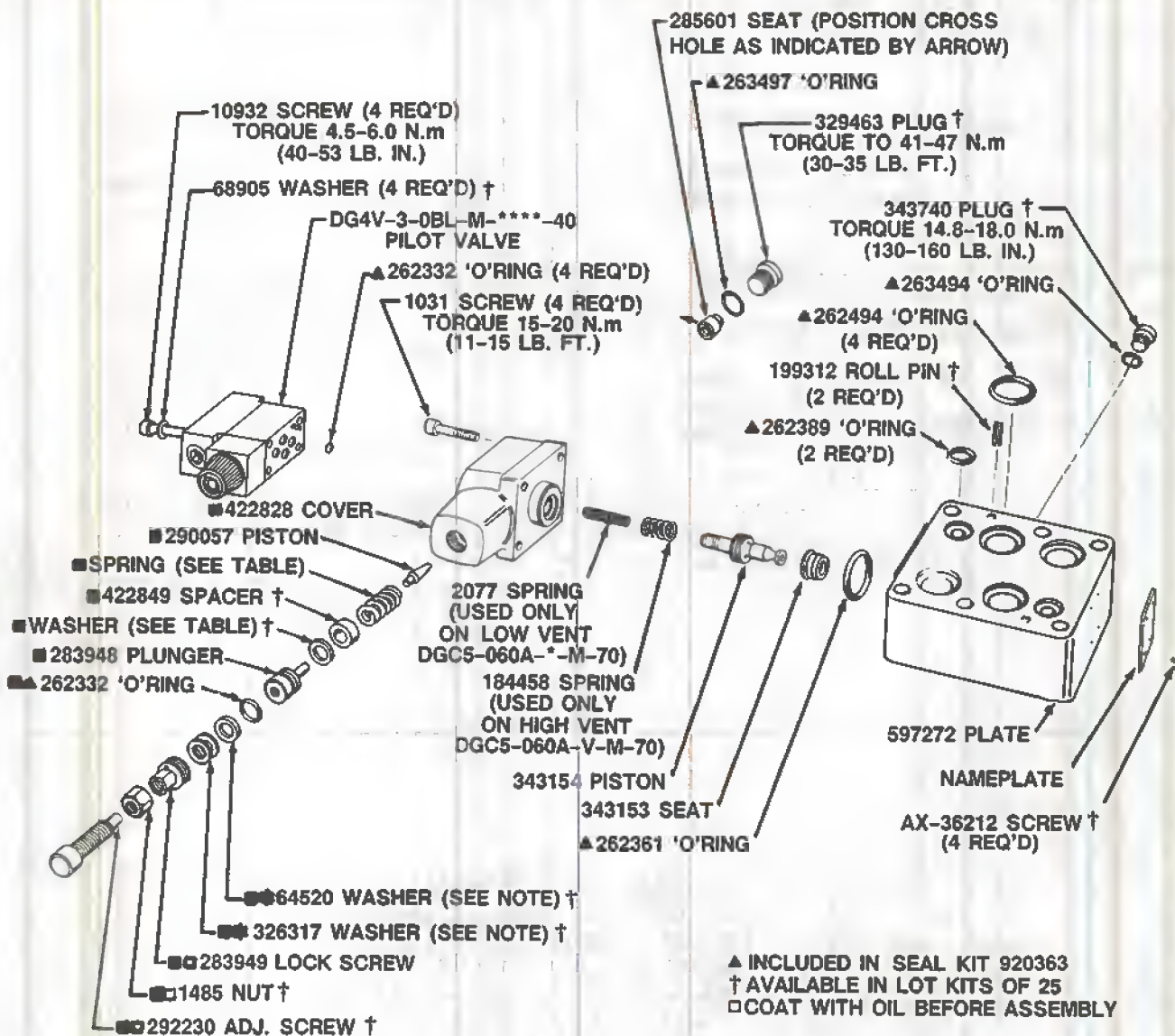
Service Parts Information

SOLENOID CONTROLLED RELIEF VALVE MODULE

VICKERS

A TRIMETAL COMPANY

(F3)-DGC5-060A(P)-*(V)-M(P**)-**-*-70



MODEL	INCLUDED IN COVER S/A	SPRING	WASHER
DGC5-060A-B-*M-70	926570	2280	OMIT
DGC5-060A-C-*M-70	926571	583937	233110
DGC5-060A-F-*M-70	926572	2281	OMIT

*** NOTE**
USE AS REQUIRED TO OBTAIN
PROPER ADJUSTMENT RANGE.

REFER TO I-3862-S FOR PILOT
VALVE PARTS BREAKDOWN

MODEL CODE BREAKDOWN

C G 03 B (V) 10
1 2 3 4 5 6

1 RELIEF VALVE

4 PRESSURE RANGE

B - 75 - 1000 PSI
C - 500 - 2000 PSI
F - 1500 - 3000 PSI

2 MOUNTING TYPE

G - Manifold or Subplate

5 HIGH VENT SPRING

Omit if not required

3 VALVE SIZE

03 - 3/8" Nominal Size

6 DESIGN

For satisfactory service life of these components, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from OFP, OFR and OFRS filter series are recommended.

Litho in U.S.A.

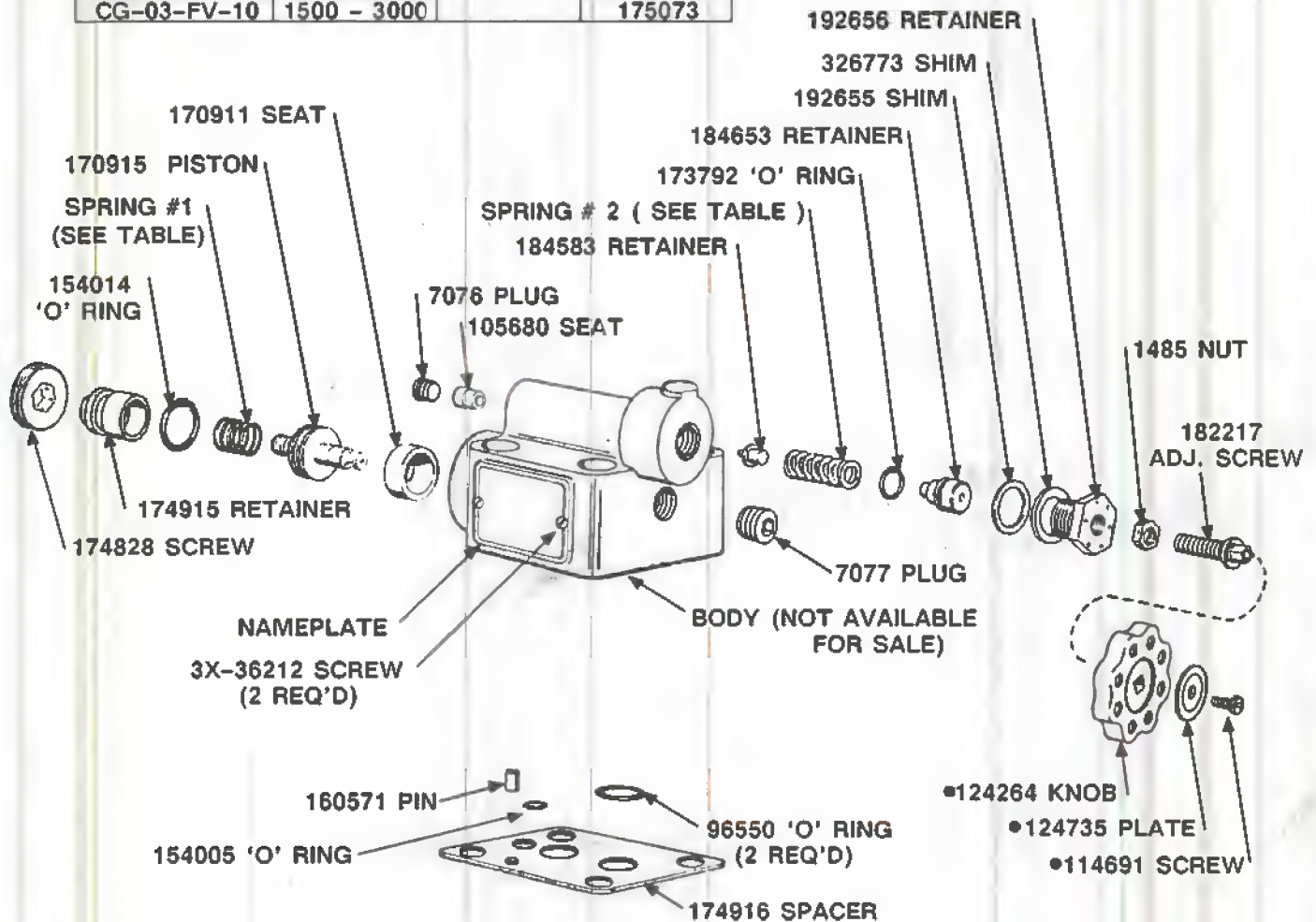
Service Parts Information

VICKERS
A TRIMMOVA COMPANY

HIGH PRESSURE
RELIEF VALVES

CG-03-**-10

MODEL	PRESSURE RANGE	SPRING #1	SPRING #2
CG-03-B-10	90 - 1000	175070	175071
CG-03-C-10	500 - 2000		175072
CG-03-F-10	1500 - 3000		175073
CG-03-BV-10	75 - 1000	184458	175071
CG-03-CV-10	500 - 2000		175072
CG-03-FV-10	1500 - 3000		175073



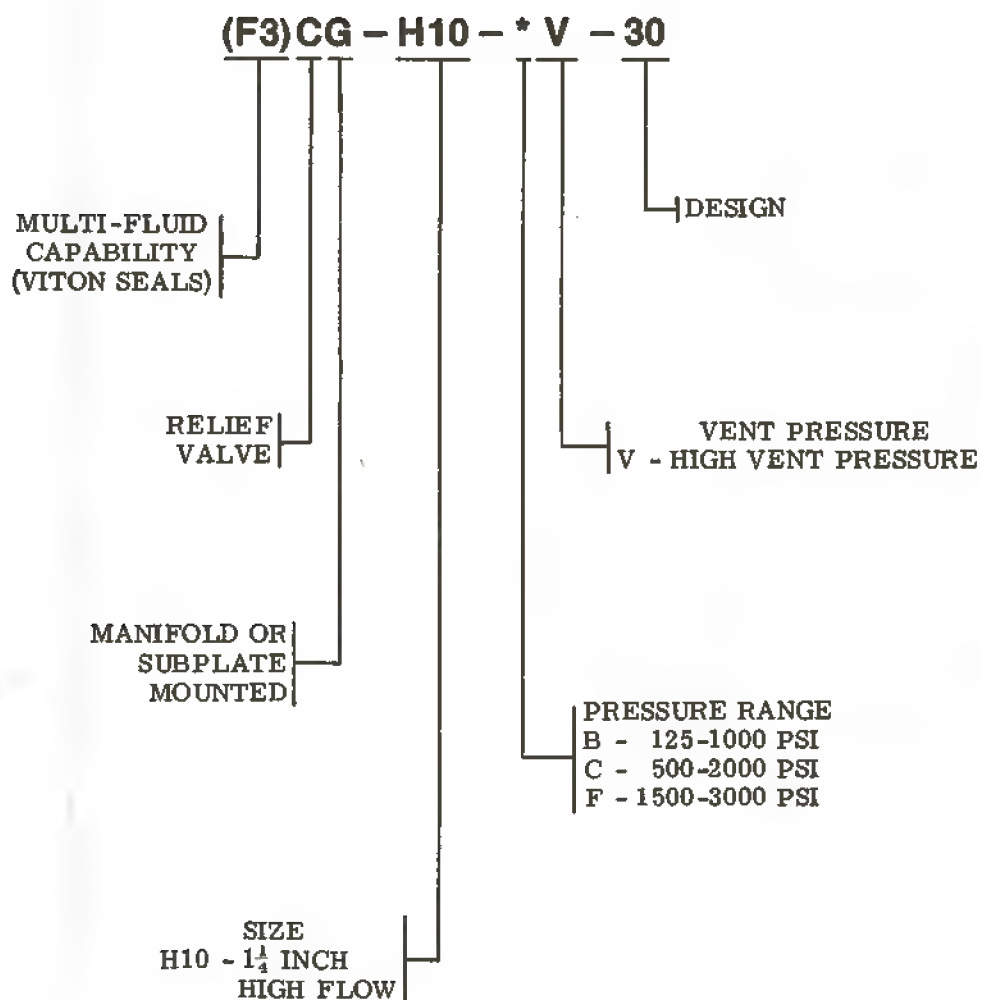
• Models with handwheel controls are available. Specify in model number by adding suffix -S81. Example: CG-03-*-10-S81

Vickers, Incorporated
P.O. Box 302
Troy, Michigan 48007-0302

Released 12-1-87

I-3401-S

MODEL CODE BREAKDOWN



For satisfactory service life of these components in industrial applications, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from Vickers OFP, OFR, and OFRS series are recommended.

Litho in U. S. A.

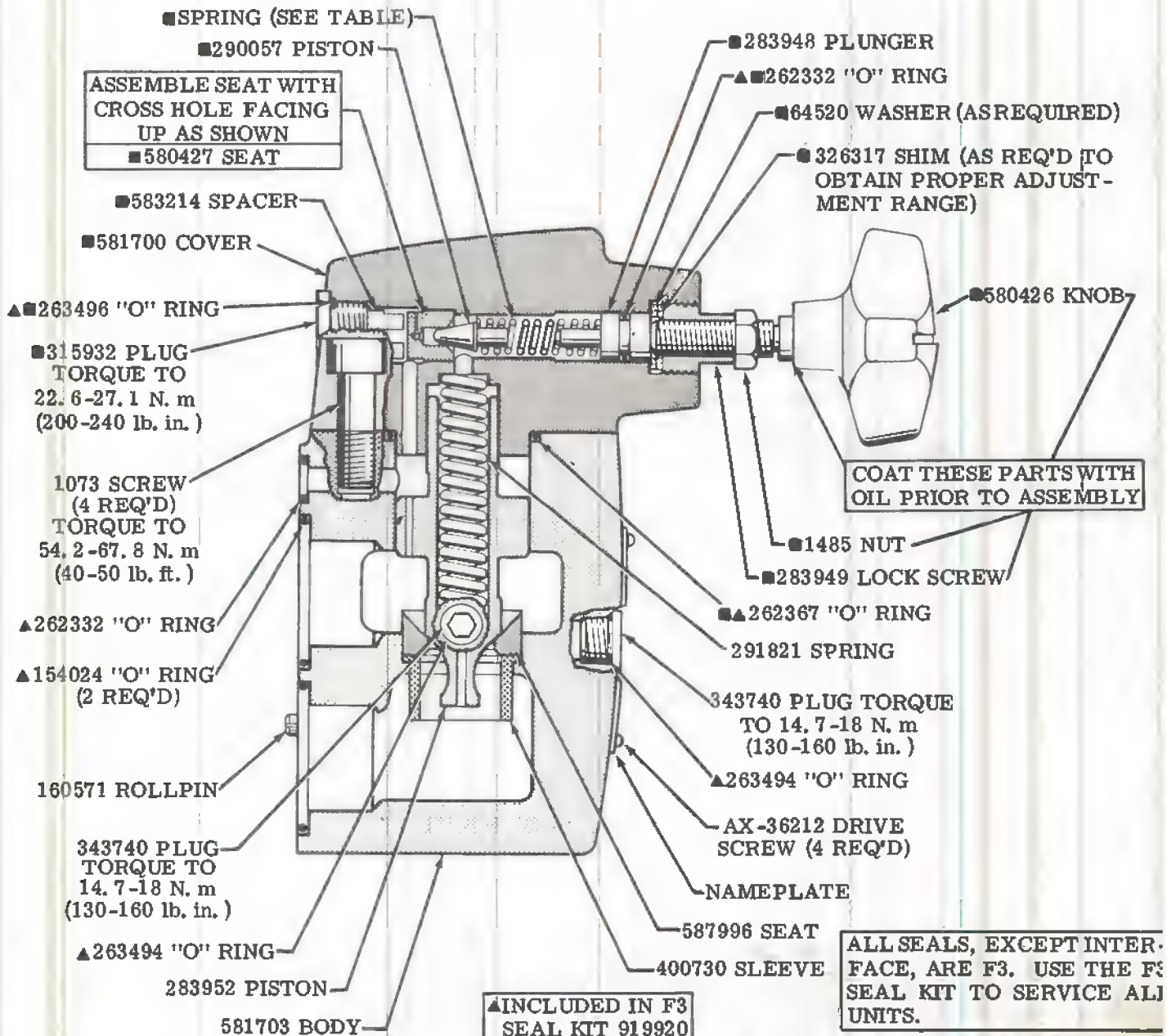
Service Parts Information

**BALANCED
PISTON TYPE
HIGH FLOW
RELIEF VALVE**

CG-H10-*V-30

VICKERS
A TRIMONA COMPANY

MODEL	■ SPRING	PRESSURE RANGE PSI	■ INCLUDED IN COVERS/A KIT
CG-H10-BV-30	2280	125-1000	941286
CG-H10-CV-30	583937	500-2000	941287
CG-H10-FV-30	2281	1500-3000	941288

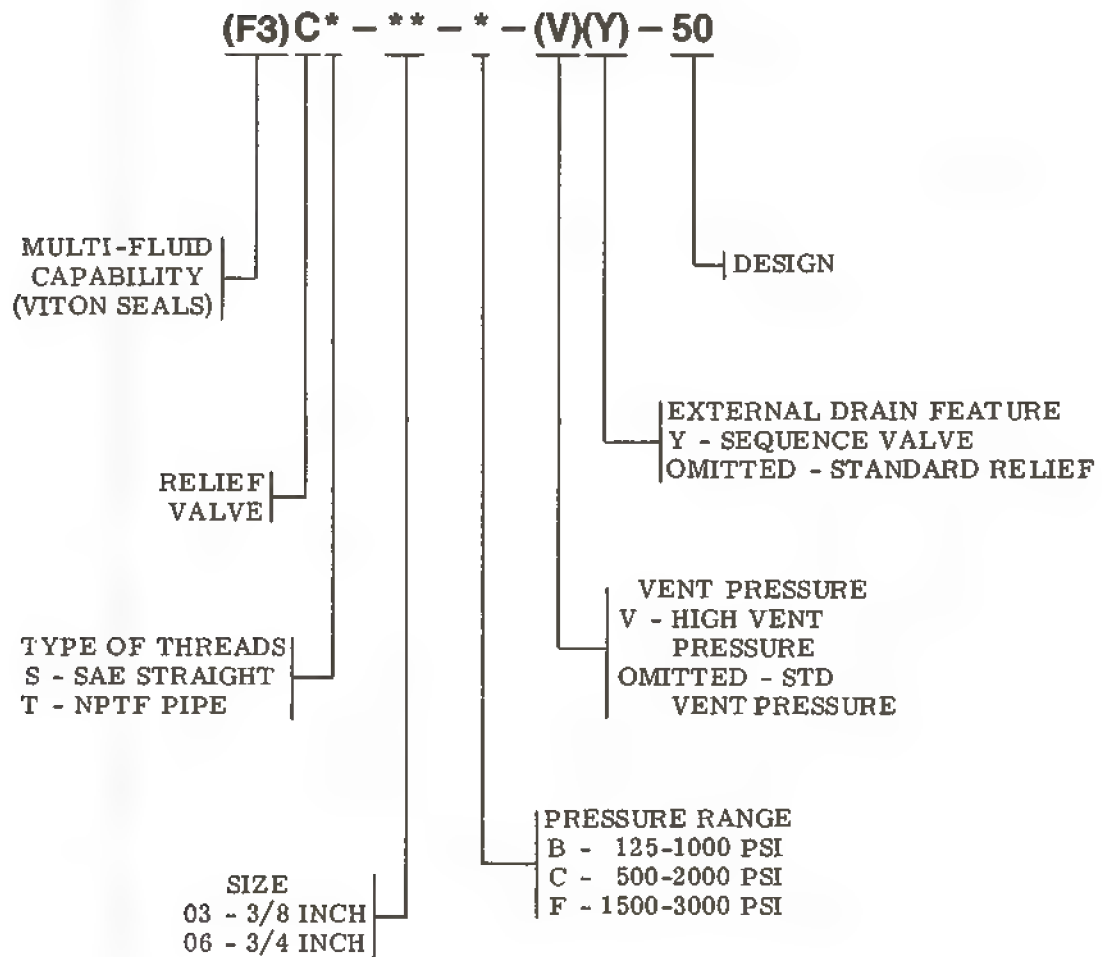


Vickers, Incorporated
P.O. Box 302
Troy, Michigan 48007-0302

Revised 5-1-85

I-3399-S

MODEL CODE BREAKDOWN



For satisfactory service life of these components, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from Vickers OFP, OFR, and OFRS series are recommended.

Litho in U. S. A.

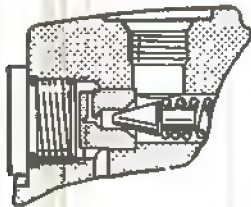
Service Parts Information

VICKERS

A TRIMONA COMPANY

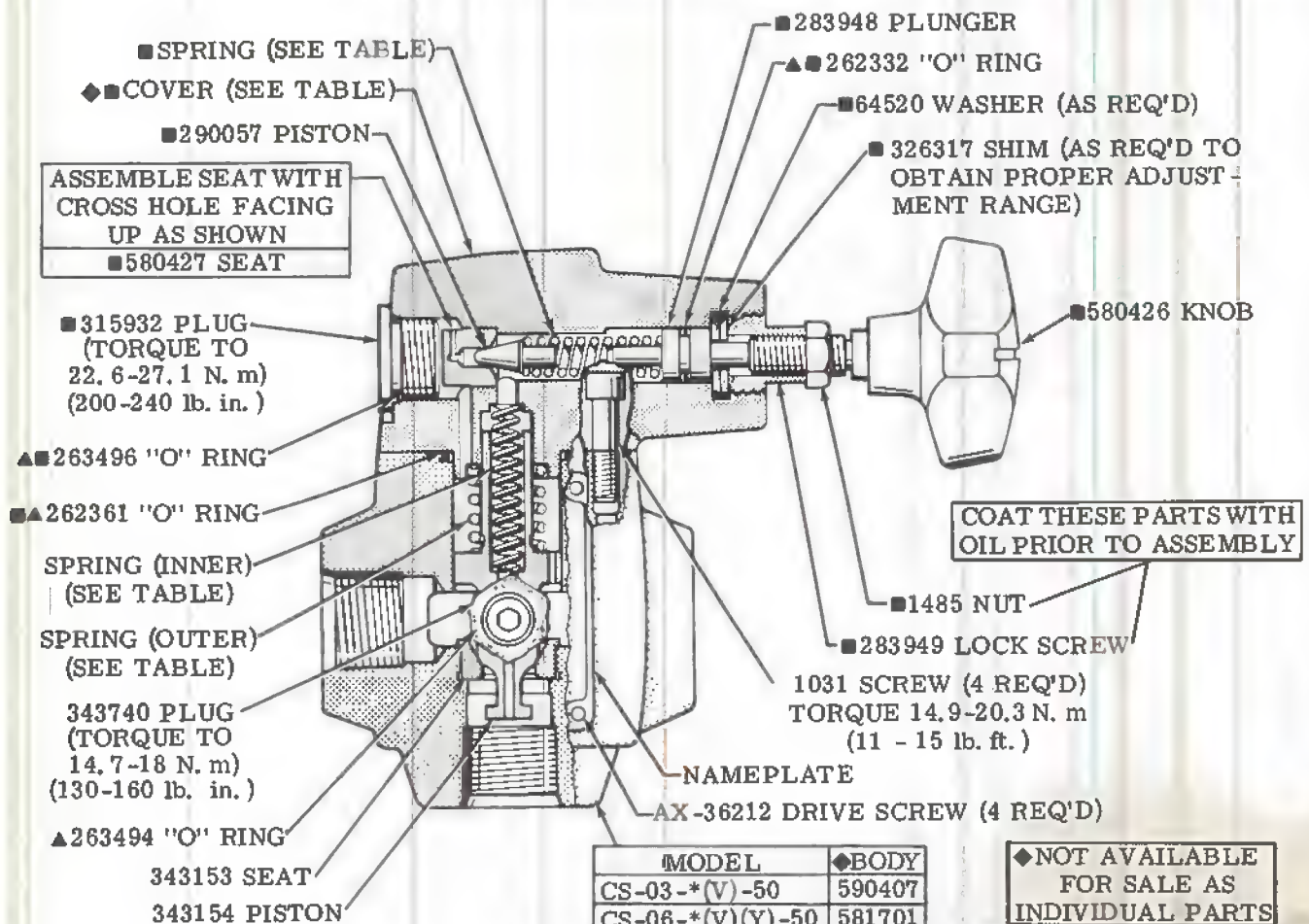
BALANCED PISTON TYPE RELIEF & SEQUENCE VALVES

(F3)C*-**-*(V)(Y)-50



"Y" COVER ASSEMBLY
(SEE TABLE)

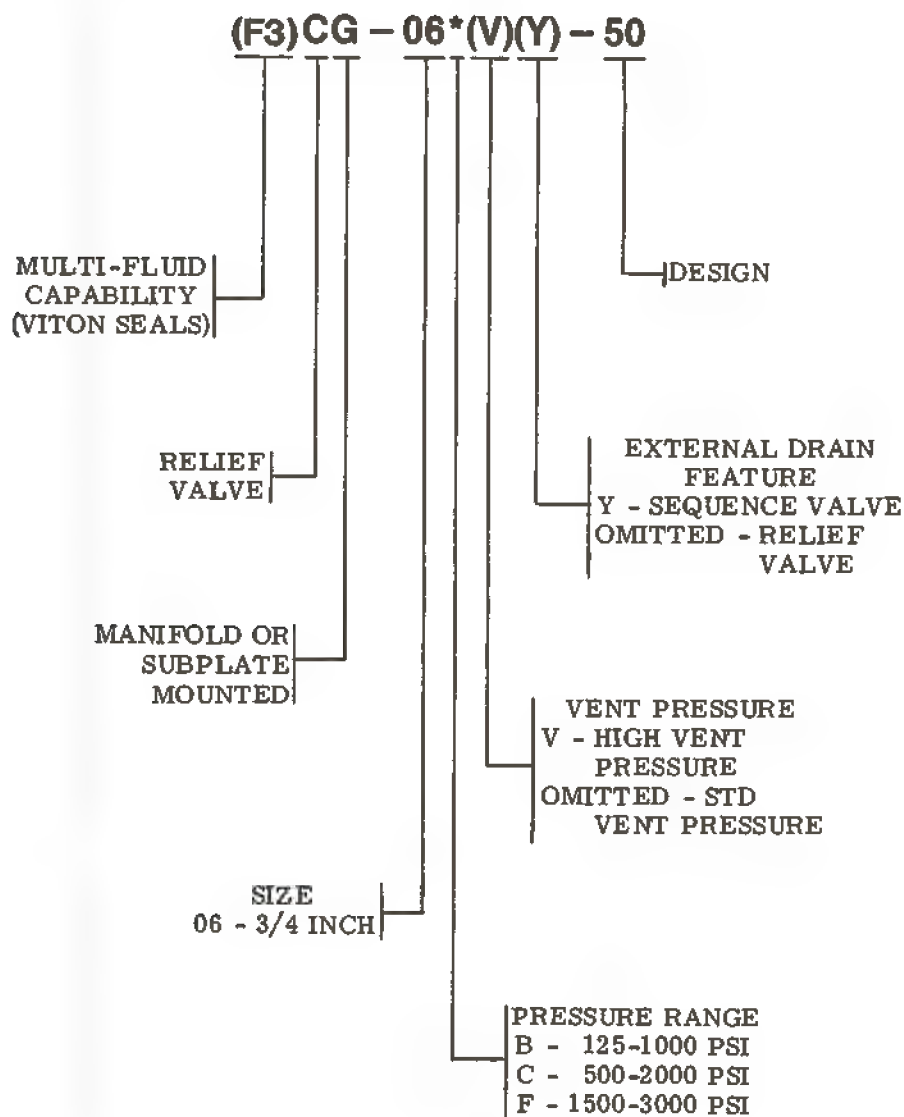
MODEL	COVER	SPRING (OUTER)	SPRING (INNER)	SPRING	PRESSURE RANGE PSI	INCLUDED IN COVER S/A
C*-0*-B-50	581702		2077			941280
C*-0*-BV-50		184458		2280	125-1000	
C*-0*-BVY-50	590307					941283
C*-0*-BY-50			2077			
C*-0*-C-50	581702					941281
C*-0*-CV-50		184458		583937	500-2000	
C*-0*-CVY-50	590307					941284
C*-0*-CY-50			2077			
C*-0*-F-50	581702					941282
C*-0*-FV-50		184458		2281	1500-3000	
C*-0*-FVY-50	590307					941285
C*-0*-FY-50			2077			



◆ NOT AVAILABLE
FOR SALE AS
INDIVIDUAL PARTS

▲ INCLUDED IN
F3 SEAL KIT 919922

MODEL CODE BREAKDOWN



To insure sustained efficiency and maximum trouble-free life of this precision equipment, initial and continuous filtration of the fluid medium to 25 microns absolute or less is essential. (For information pertaining to Sperry Wickers economical filters, see bulletin 81-216.)

Litho in U. S. A.

Service Parts Information

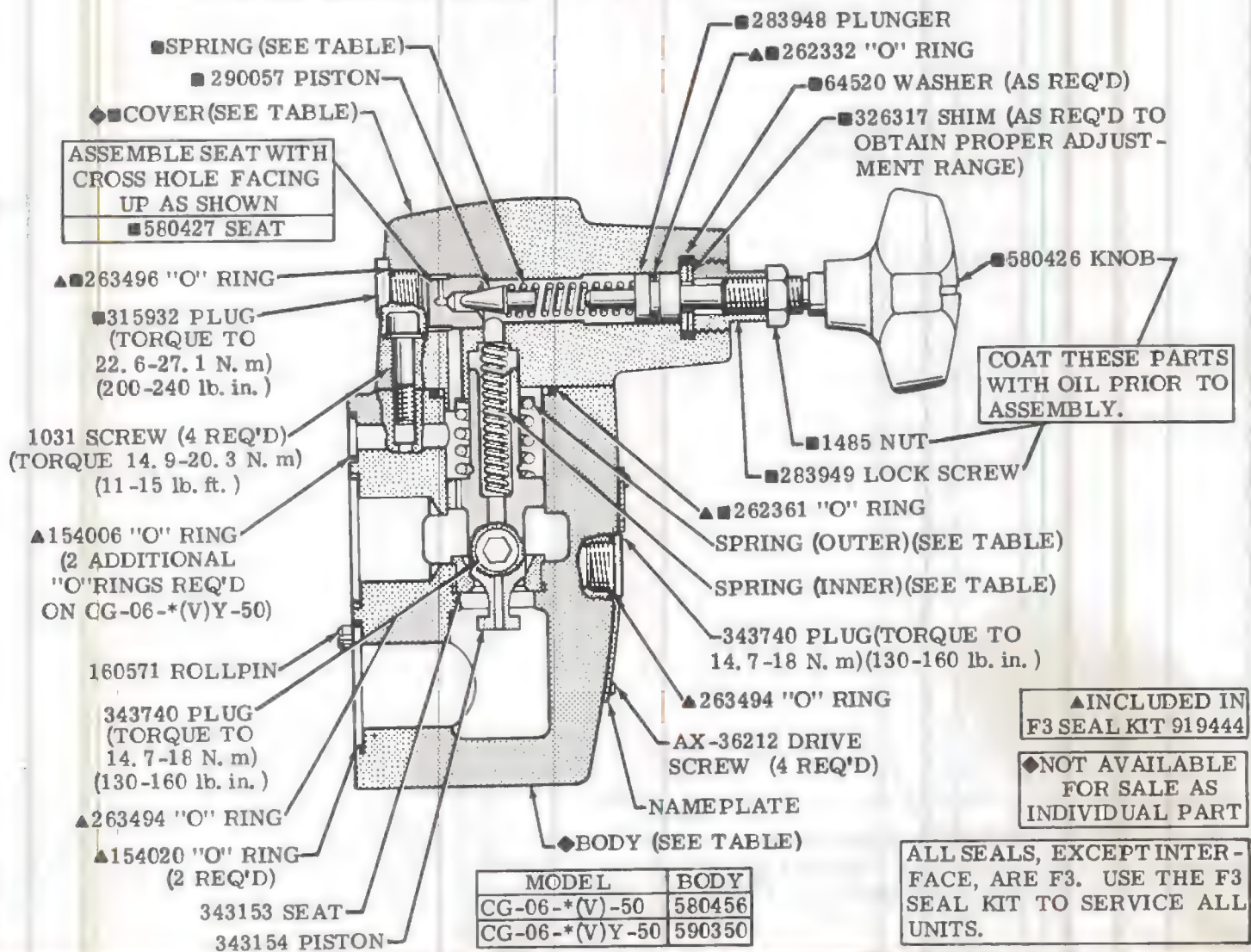
VICKERS

A TRIMONA COMPANY

BALANCED PISTON TYPE RELIEF & SEQUENCE VALVES

CG-06-*(V)(Y)-50

MODEL	COVER	SPRING (OUTER)	SPRING (INNER)	SPRING	PRESSURE RANGE PSI	INCLUDED IN COVER S/A
CG-06-B-50	581702		2077			941280
CG-06-BV-50		184458		2280	125-1000	
CG-06-BVY-50	590315					941283
CG-06-BY-50			2077			
CG-06-C-50	581702					941281
CG-06-CV-50		184458		583937	500-2000	
CG-06-CVY-50	590315					941284
CG-06-CY-50			2077			
CG-06-F-50	581702					941282
CG-06-FV-50		184458		2281	1500-3000	
CG-06-FVY-50	590315					941285
CG-06-FY-50			2077			

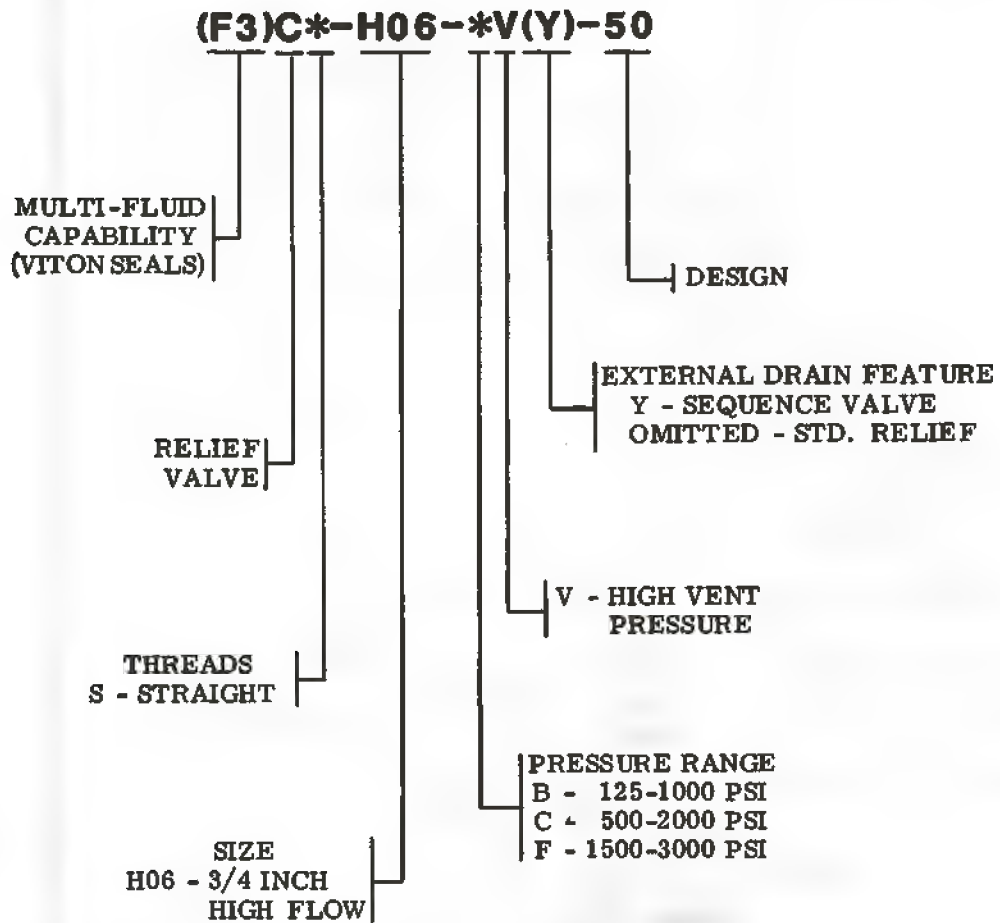


Vickers, Incorporated
P.O. Box 302
Troy, Michigan 48007-0302

Revised 11-1-85

I-336B-S

MODEL CODE BREAKDOWN



For satisfactory service life of these components in industrial applications, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from Vickers OFP, OFR, and OFRS series are recommended.

Litho in U. S. A.

Service Parts Information

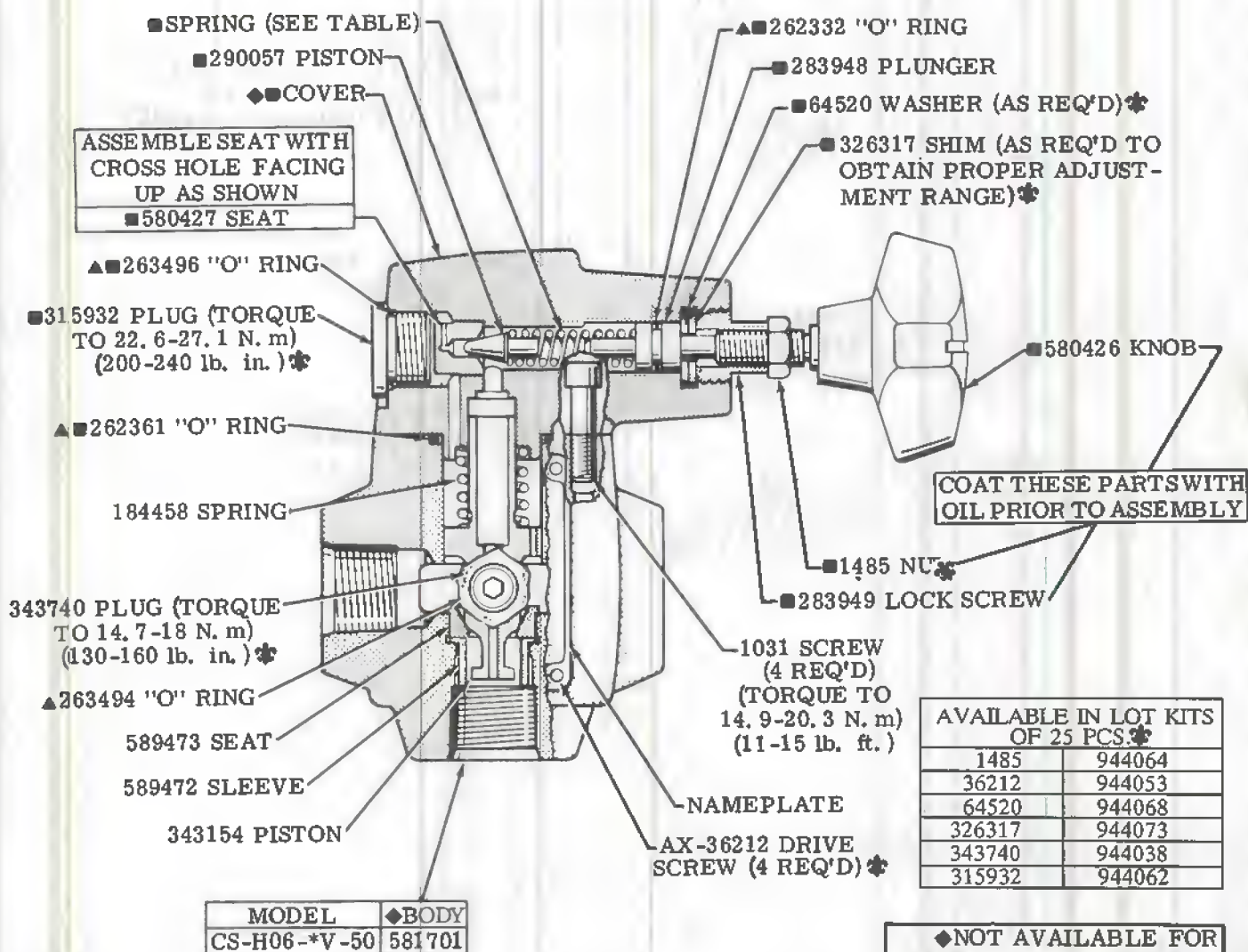
VICKERS

ATRIUM COMPANY

BALANCED PISTON HIGH FLOW RELIEF & SEQUENCE VALVE

CS-H06-*V(Y)-50

MODEL	SPRING	PRESSURE RANGE PSI	INCLUDED IN COVER S/A
C*-H06-BV-50	2280	125 - 1000	941280
C*-H06-BVY-50			941283
C*-H06-CV-50	583937	500 - 2000	941281
C*-H06-CVY-50			941284
C*-H06-FV-50	2281	1500 - 3000	941282
C*-H06-FVY-50			941285



◆ NOT AVAILABLE FOR SALE AS INDIVIDUAL ITEM

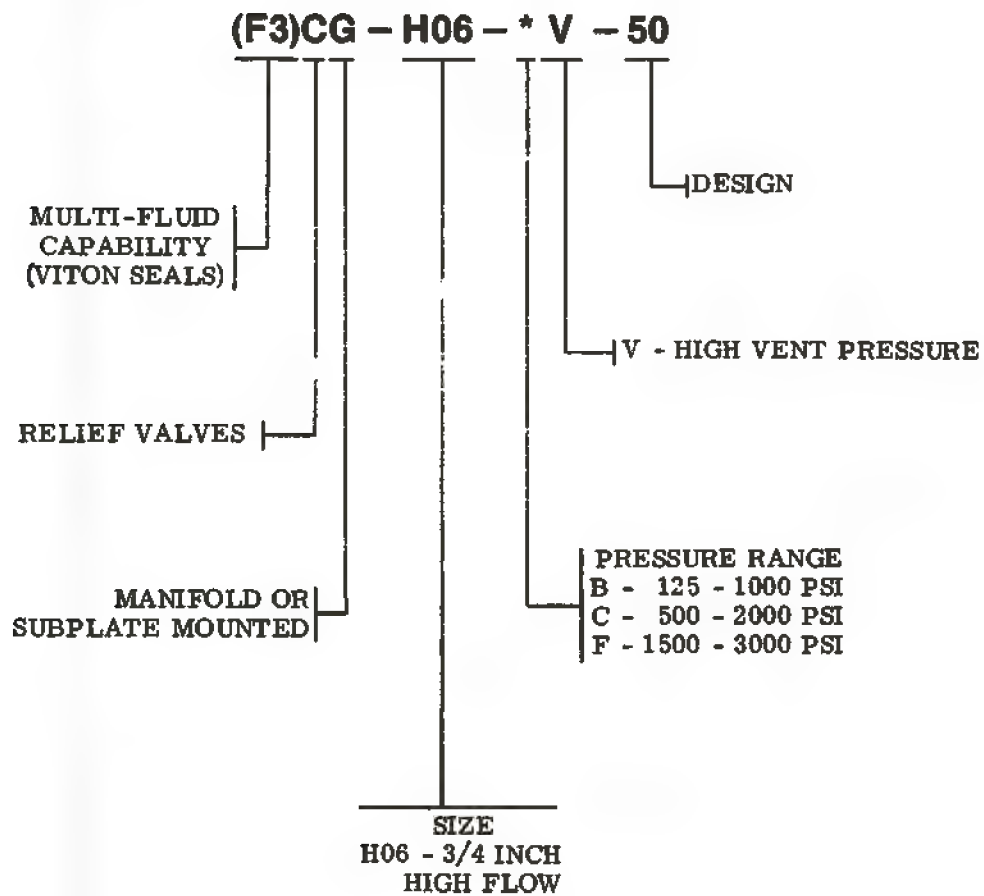
▲ INCLUDED IN F3 SEAL KIT 91922

Vickers, Incorporated
P.O. Box 302
Troy, Michigan 48007-0302

Revised 8-1-87

I-3367-S

MODEL CODE BREAKDOWN



For satisfactory service life of these components, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from Vickers OFP, OFR, and OFRS series are recommended.

Litho in U. S. A.

Service Parts Information

BALANCED PISTON TYPE RELIEF VALVES

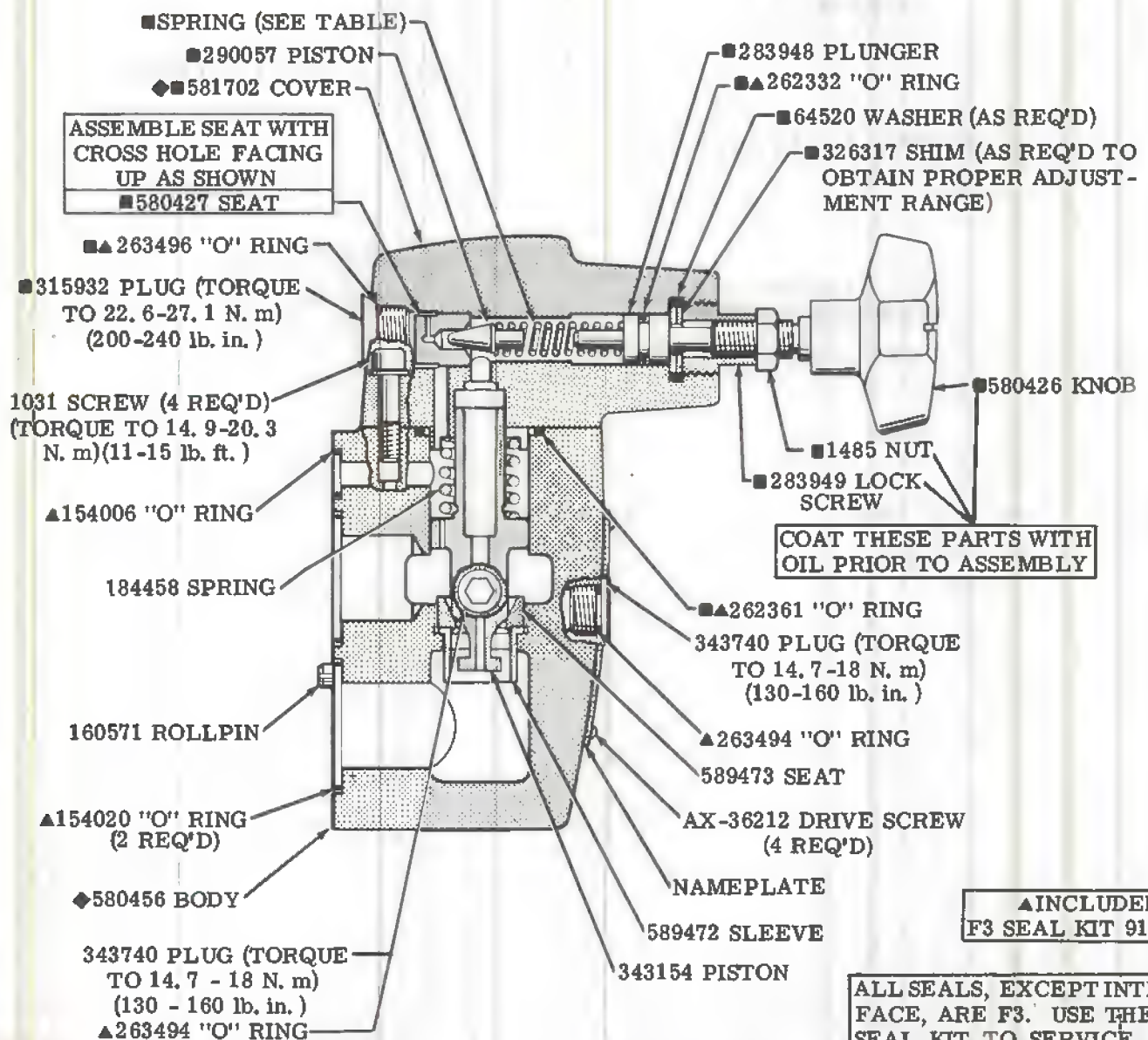
CG-H06-BV-50
CG-H06-CV-50
CG-H06-FV-50

VICKERS

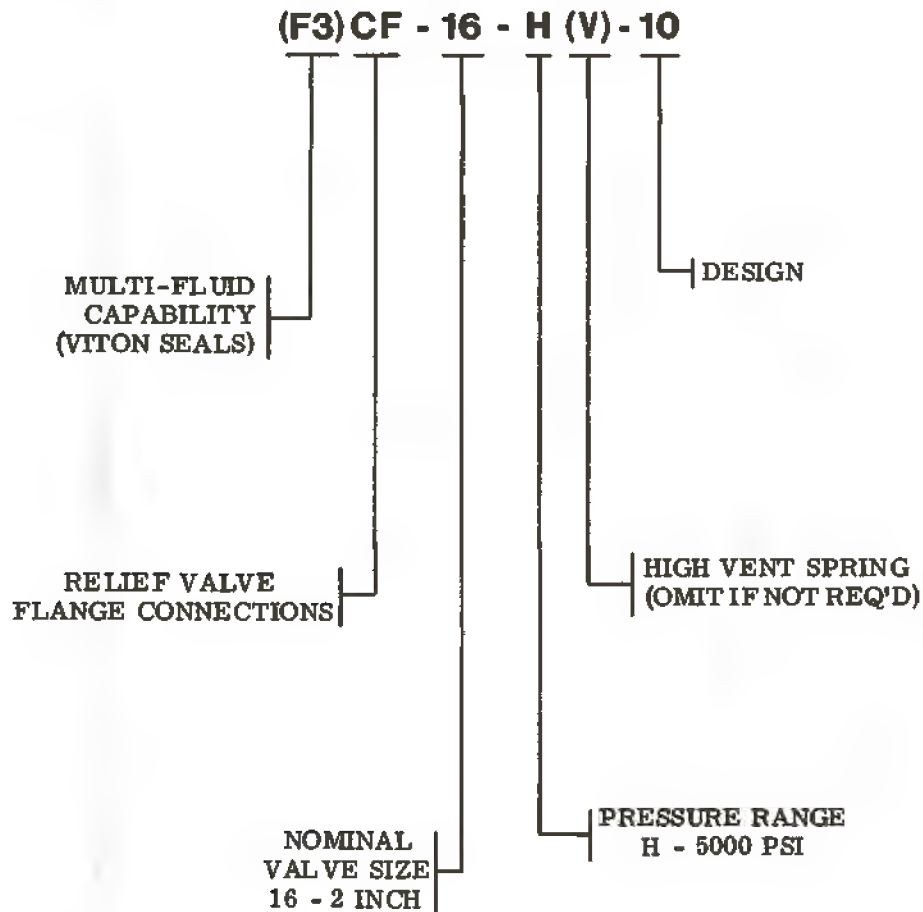
A TRIMONA COMPANY

MODEL	SPRING	PRESSURE RANGE PSI	INCLUDED IN COVER S/A
CG-H06-BV-50	2280	125-1000	941280
CG-H06-CV-50	583937	500-2000	941281
CG-H06-FV-50	2281	1500-3000	941282

◆NOT AVAILABLE
FOR SALE AS
INDIVIDUAL PART



MODEL CODE BREAKDOWN



For satisfactory service life of these components, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from Vickers OFP, OFR, and OFRS series are recommended.

Litho in U. S. A.

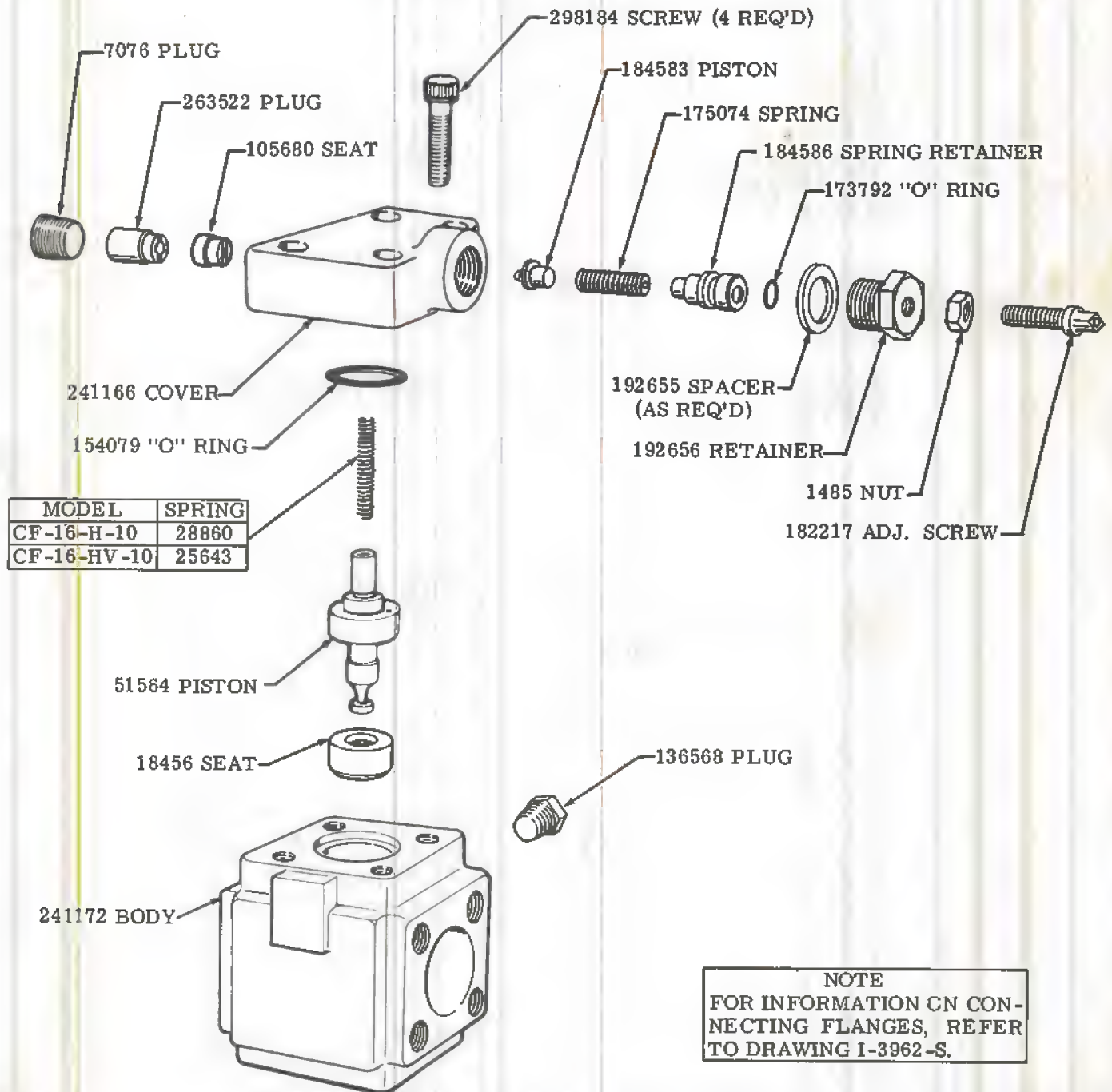
Service Parts Information

RELIEF VALVE

CF-16-H(V)-10

VICKERS.

A TRIMONA COMPANY

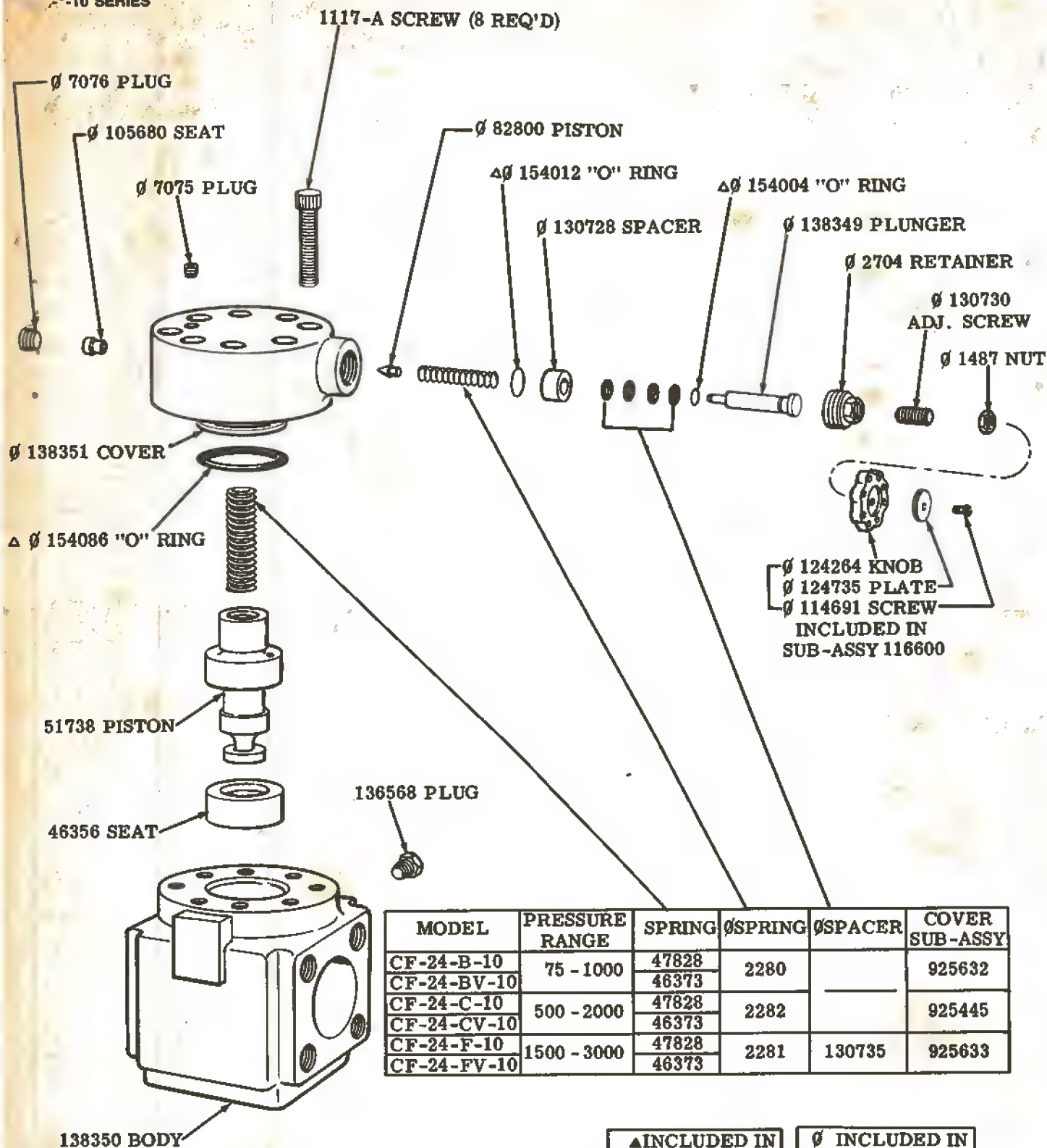


Vickers, Incorporated
P.O. Box 302
Troy, Michigan 48007-0302

Revised 11-1-85

I-3360-S

CF-10 SERIES



▲ INCLUDED IN
SEAL KIT 919323

Ø INCLUDED IN
COVER SUB-ASSY

NOTE:
FOR INFORMATION ON CONNECTING
FLANGES REFER TO DRAWING I-3962-S

For satisfactory service life of these components in industrial applications, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from Vickers OFF, QFR, and OFRS series are recommended.

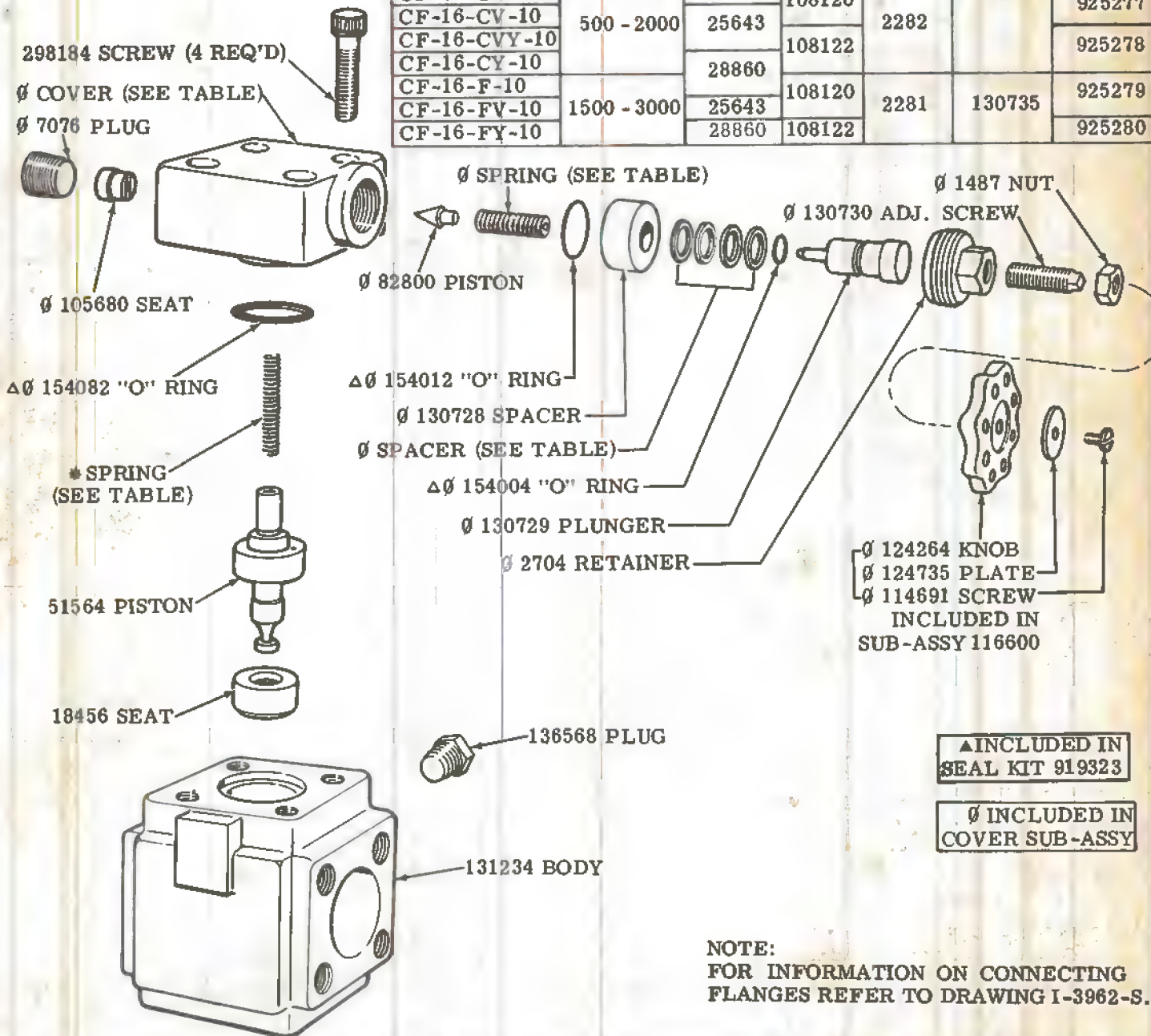
Litho in U.S.A.

Service Parts Information

CF16/24 SERIES

CF-16-* -10 SERIES

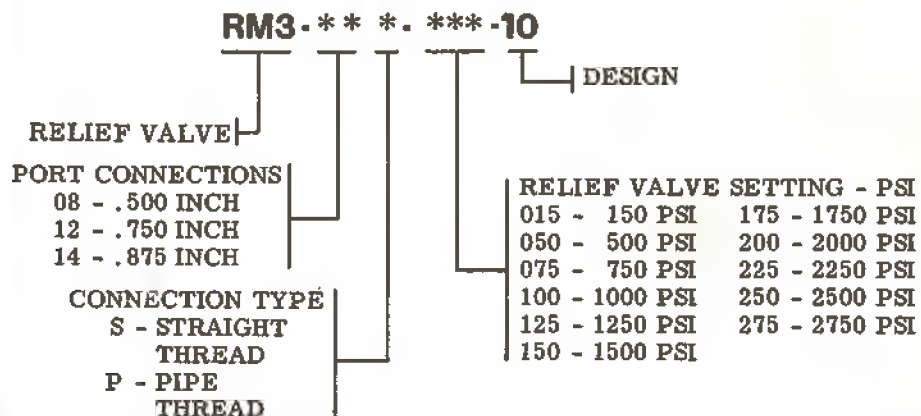
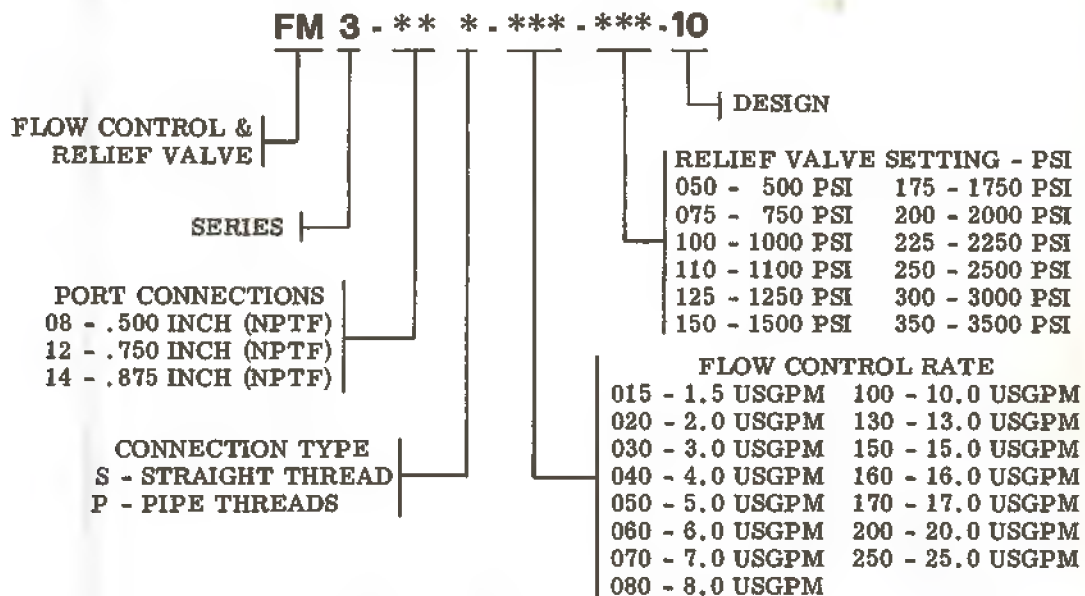
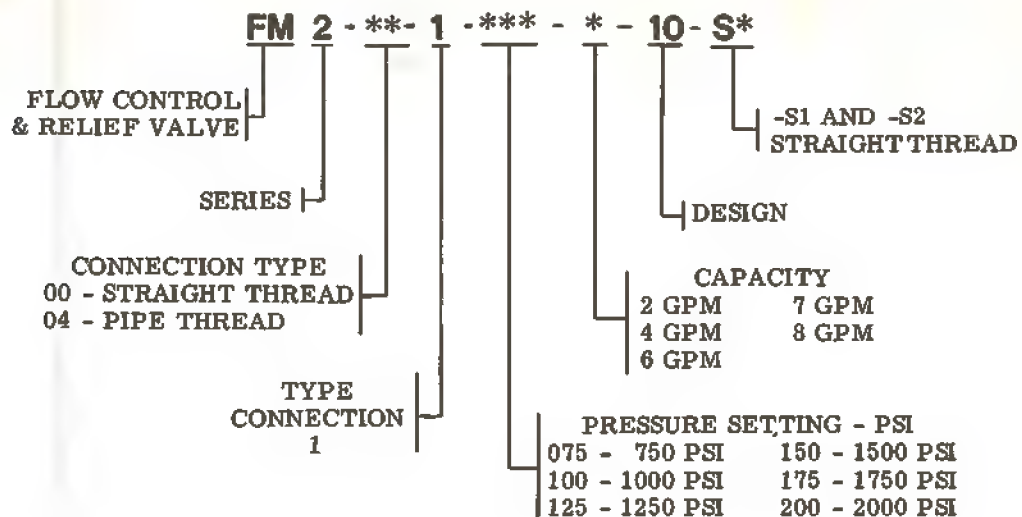
MODEL	PRESSURE RANGE	*SPRING	COVER	SPRING	SPACER	COVER SUB-ASSY
CF-16-B-10	75 - 1000	28860	108120	2280		925275
CF-16-BV-10		25643				
CF-16-BY-10		28860				925276
CF-16-C-10	500 - 2000	25643	108120	2282		925277
CF-16-CV-10			108122			
CF-16-CVY-10			108122			925278
CF-16-CY-10	1500 - 3000	28860	108120	2281	130735	925279
CF-16-F-10		25643				
CF-16-FV-10		28860				925280
CF-16-FY-10		28860				



▲ INCLUDED IN
SEAL KIT 919323

Ø INCLUDED IN
COVER SUB-ASSY

MODEL CODE BREAKDOWN



For satisfactory service life of these components, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from OFF, OFR and OFRS filter series are recommended.

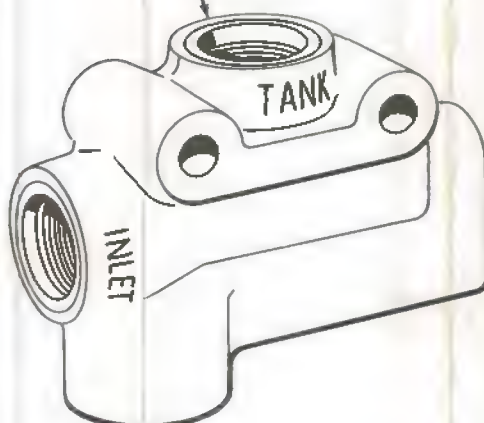
Litho in U. S. A.

M3-***-***-10

BODY NOT SOLD SEPARATELY.
ORDER BY COMPLETE
MODEL NUMBER

230661 SNAP RING

239766 SPRING

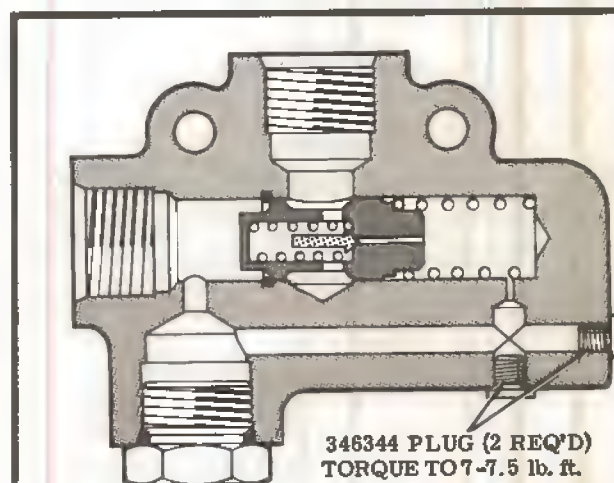


CONTROL VALVE SUB-ASSY	RELIEF PRESSURE	MODEL
284219	150 PSI	RM3-***-015-10
233018	500 PSI	FM3 & RM3-***-050-10
232794	750 PSI	FM3 & RM3-***-075-10
232795	1000 PSI	FM3 & RM3-***-100-10
265620	1100 PSI	FM3-***-***-110-10
232796	1250 PSI	FM3 & RM3-***-125-10
232797	1500 PSI	FM3 & RM3-***-150-10
232798	1750 PSI	FM3 & RM3-***-175-10
232799	2000 PSI	FM3 & RM3-***-200-10
233019	2250 PSI	FM3 & RM3-***-225-10
233020	2500 PSI	FM3 & RM3-***-250-10
266200	2750 PSI	RM3-***-275-10
■ 266054	3000 PSI	FM3-***-***-300-10
■ 277557	3500 PSI	FM3-***-***-350-10

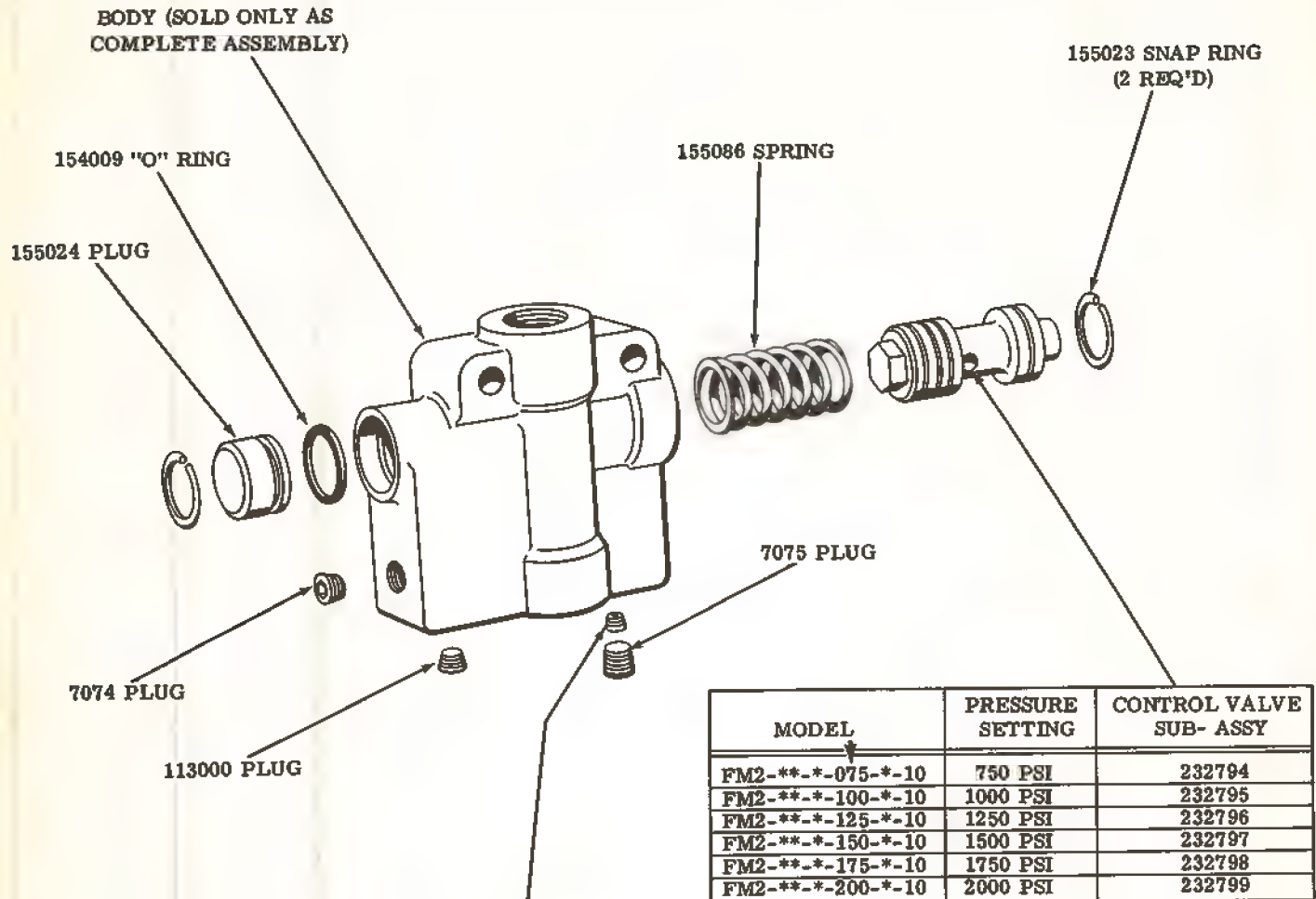


MODEL	PLUG	"O" RING
RM3-12S-***-10	186580	154129
RM3-14S-***-10	181792	154130
RM3-08P-***-10	7077	—

■ CAUTION
MODELS WITH CRACKING PRESSURES 3000 PSI
AND ABOVE REQUIRE -005 MODEL SUFFIX
FEATURE. (NPT 7074 PLUG IN PLACE OF 1650
BALL)

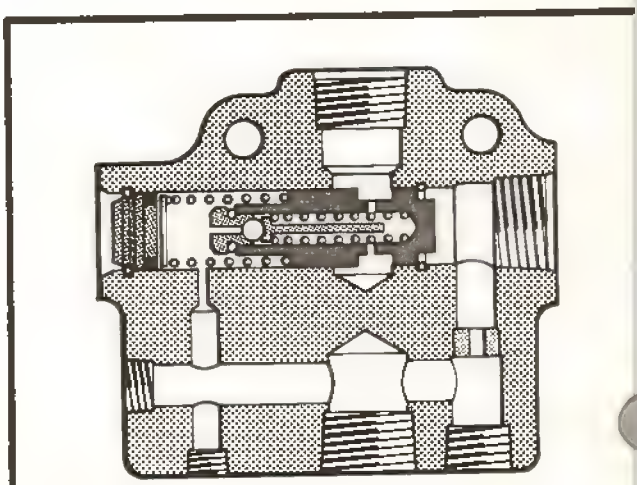


V2-0*-1.*-10-S*



MODEL	PRESSURE SETTING	CONTROL VALVE SUB- ASSY
FM2-**-*-075-*-10	750 PSI	232794
FM2-**-*-100-*-10	1000 PSI	232795
FM2-**-*-125-*-10	1250 PSI	232796
FM2-**-*-150-*-10	1500 PSI	232797
FM2-**-*-175-*-10	1750 PSI	232798
FM2-**-*-200-*-10	2000 PSI	232799

MODEL	CAPACITY (GPM)	RESTRICTION PLUG
FM2-**-*-2-10	2	167463
FM2-**-*-4-10	4	167464
FM2-**-*-6-10	6	167465
FM2-**-*-7-10	7	165359
FM2-**-*-8-10	8	167466

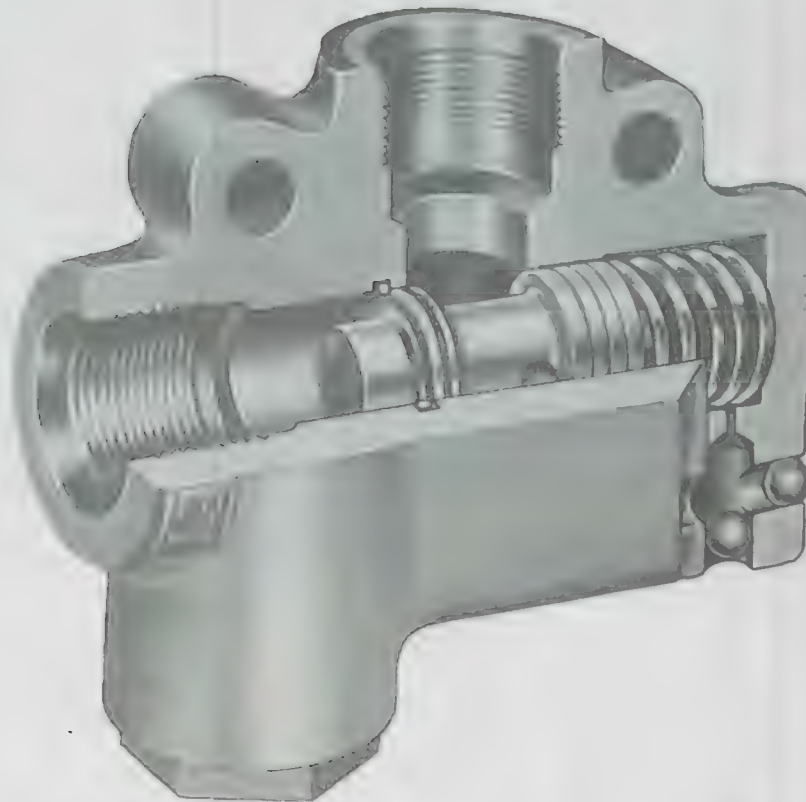




Service Parts Information

Flow
Control
& Relief
Valves

FM2, FM3 and RM3



Vickers, Incorporated

1401 Crooks Road
Troy, Michigan 48064

Revised 12-1-87

M-2551-S

SEAL KIT NOTE

design valves are manufactured as shown with F3 ed internally. Interface seals are standard Nitrile l and are converted to F3 in the seal kit. All seals al kit are F3.

COL	DIAGRAM PLATE			
	"A"		"C"	"N"
PART	LH	RH	STD/S87/S163	
213231	577490	290348		577486
213232			290345	
			577480	

NOTE

OL DESIGNATION OF (68B) INDICATES VALVE EMBLED "LH" & IS USED AS A PILOT FOR TWO E VALVES WITH "4" OR "8" TYPE MAIN STAGE S.

NOTE

SINGLE SOLENOID MODELS RIGHT HAND AS- LY SHOWN. FOR LEFT HAND ASSEMBLY ALL S ARE REVERSED, EXCEPT BODY & SPOOL. LH MODEL: DG4S4-01**-5*-LH

FOR MODELS WITH SOLENOID INDICATOR LIGHTS

IDENTIFICATION PLATE

298785 SCREW
TORQUE TO
7-9 lb. in.
(0.8-1.0 N. m)

SOLENOID
INDICATOR
LIGHT

298782 GASKET

SOLENOID INDICATOR LIGHT KIT (INCLUDES ALL PARTS IDENTIFIED)

VOLTAGE RANGE	KIT
100 thru 127	941615
192 thru 233	941617

NOTE

REFER TO PARTS DRAWING I-3487-S FOR MODELS WITH PLUG-IN FEATURE.

416834 RIVET (4 REQ'D)

DIAGRAM PLATE
(SEE TABLE)

64765 PLUG
LOCKWASHER (PART
OF FASTENER KIT)

USE ON "N" DETENT MODELS

237976 SPRING

*ROLLPIN

*RETAINING RING

*DETENT PIN (2 REQ'D)

*DETENT RETAINER

Δ262327 "O" RING

Δ262354 "O" RING

281422 GUIDE

236797 SNAP RING

SOLENOID S/A
(SEE TABLE)

INCLUDED IN STD. SOLENOID S/A.
USE "F3" SOLENOID S/A FOR
"F3" APPLICATIONS.

USE ON "A,C, & C-S87" MODELS

345825 SCREW
TORQUE TO 3.4-3.9 N. m
(30-35 lb. in.)

750024 RETAINER
COIL (SEE TABLE)

750040 PLUNGER

Δ154002 "O" RING (NITRILE)

Δ345913 GASKET

185645 SCREW (4 REQ'D)
TORQUE TO 19-23 lb. in.
(2.1-2.5 N. m)

345824 SCREW (4 REQ'D)
TORQUE TO 19-23 lb. in.
(2.1-2.5 N. m)

750039 HOUSING (NOT
AVAILABLE FOR SALE)

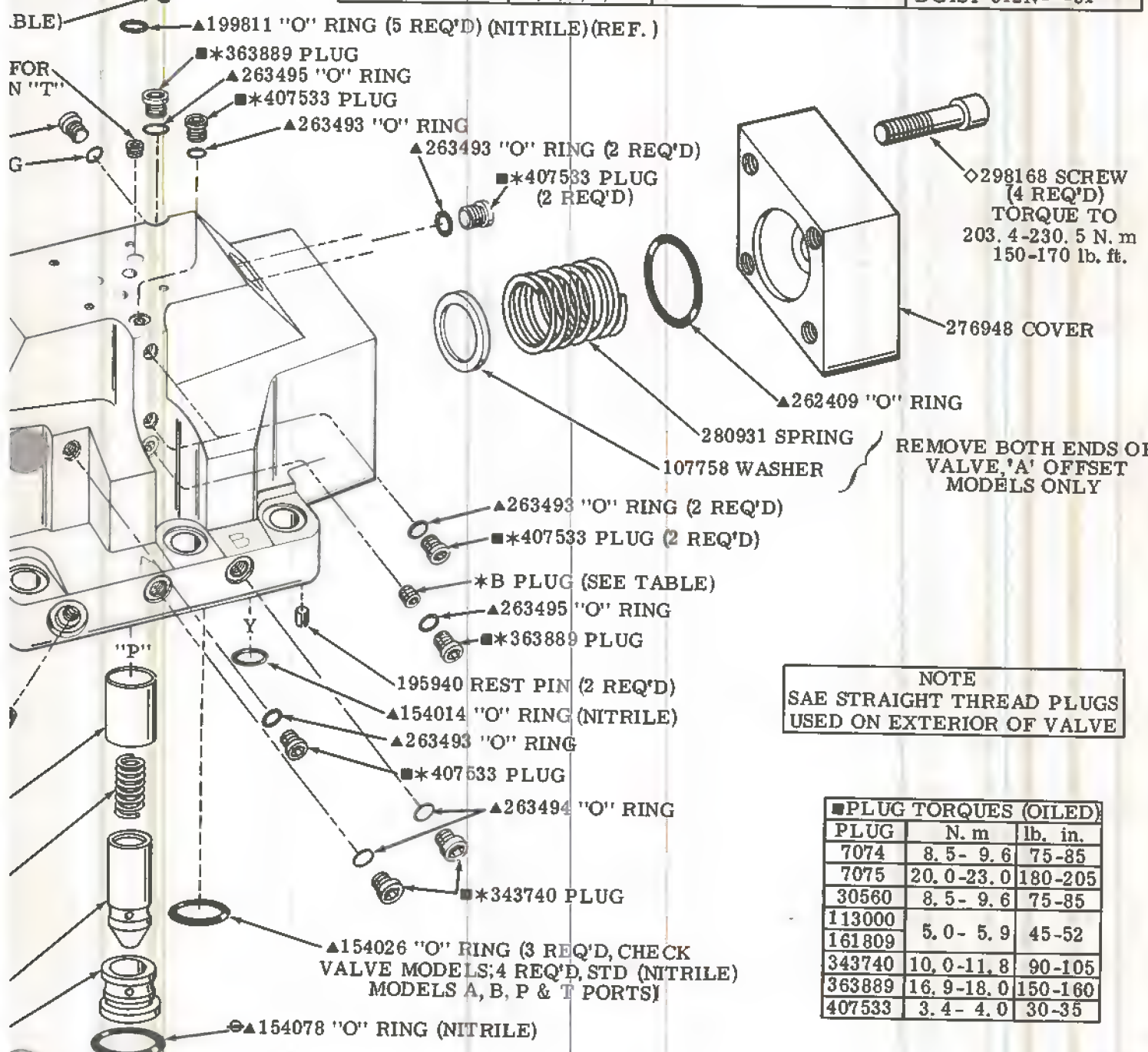
USE ON "C S163" MODELS

Δ281545 GASKET

287968 COVER

N
"A"
FOR
ILY
ODELS
-S87
WASHER
"O" RING
54 "O" RING
281422 GUIDE
236797 SNAP RING

VALVE MODEL CODE	MAIN STAGE SPOOL TYPE	VALVE IS ASSEMBLED:	
		LEFT HAND	RIGHT HAND (STD)
		PILOT VALVE MODEL CODE (SEE BACK PAGE FOR EXPLODED VIEW)	
DG5S4-10*A-53	0, 2, 6, 9, 33	DG4S4-012A-*-50-LH	DG4S4-012A-*-50
DG5S4-10*B-53	0, 1, 2, 3, 6, 9, 31, 33	DG4S4-016C-*-50-S163	DG4S4-016C-*-50-S87
	4 & 8	DG4S4-0168C-*-50-S163	DG4S4-0168C-*-50-S87
DG5S4-10*C-53	0, 1, 2, 3, 6 9, 31, 33		DG4S4-016C-*-50
	4 & 8		DG4S4-0168C-*-50
DG5S4-10*N-53	0, 2, 6, 9, 33		DG4S4-012N-*-51



PLUG TORQUES (OILED)		
PLUG	N. m	lb. in.
7074	8.5- 9.6	75-85
7075	20.0-23.0	180-205
30560	8.5- 9.6	75-85
113000	5.0- 5.9	45-52
161809		
343740	10.0-11.8	90-105
363889	16.9-18.0	150-160
407533	3.4- 4.0	30-35

SEAL KIT NOTE

The -53 design valves are manufactured as shown with F3 seals used internally. Interface seals are standard Nitrile material and are converted to F3 in the seal kit. All seals in the seal kit are F3.

MODELS WITH PILOT CHOKE

DGMFN-5-Y-AW-BW-20

587607 NUT (2 REQ'D)

591534 ADJ. SCREW (2 REQ'D)

575035 PLATE (2 REQ'D)
(BOND TO PLUG)

575025 PLUG (2 REQ'D)

TORQUE 81.30-94.90 N. m

60 - 70 lb. ft.

75026 STOP (2 REQ'D)

575031 SPRING
(2 REQ'D)

148868 ROLL PIN
(2 REQ'D)

▲263498 "O" RING
(2 REQ'D)

▲262330 "O" RING
(2 REQ'D)

575028 THROTTLE
(2 REQ'D)

36212 RIVET (2 REQ'D)

630318 DIAGRAM PLATE

▲262334 "O" RING (5 REQ'D)

BODY (NOT AVAILABLE FOR SALE)

▲263493 "O" RING (4 REQ'D)

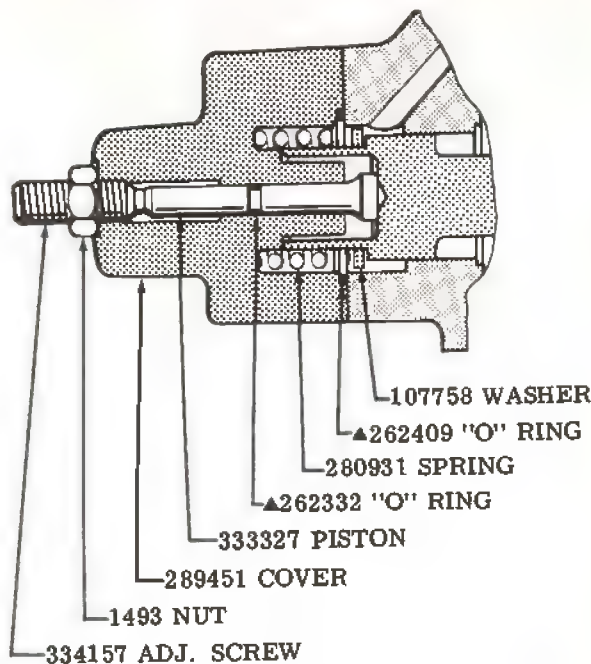
407533 PLUG (4 REQ'D)

▲INCLUDED IN

TORQUE 3.4-4.0 N. m (30-35 lb. in.)

920246 SEAL KIT

STROKE ADJUSTMENT PARTS



MODEL CODE BREAKDOWN

(F3)-(P**) DG5S4(L)-10**(X)(*)-(E)-(T)-(*)-(**AC**)-53-LH

MULTI-FLUID
CAPABILITY
(VITON SEALS)

ELECTRICAL PLUG
FEATURE (SEE
NOTE BELOW)

DIRECTIONAL VALVE

SUBPLATE OR

MANIFOLD MOUNTED

SOLENOID CONTROLLED

PILOT OPERATED

SLIDING SPOOL

FLOW DIRECTIONS

4 - 4 WAY

L - SOLENOID INDICATOR

LIGHTS

OMITTED - NONE

1.25 INCH SERIES 100

TYPE OF MAIN STAGE SPOOL

VALVE TYPE

A - SPRING OFFSET

B - SPRING CENTERED

(ONE SOLENOID)

C - SPRING CENTERED

N - NO SPRING DETENTED

LEFT HAND
ASSEMBLY

DESIGN

VOLTAGE & FREQUENCY
OMITTED - 115AC60 STD.

CHECK VALVE

OMITTED - NO CHECK VALVE

K - 5 PSI (0.35 bar)

L - 35 PSI (2.4 bar)

R - 50 PSI (3.45 bar)

S - 75 PSI (5.2 bar)

T - INTERNAL PILOT DRAIN

OMITTED - EXTERNAL PILOT DRAIN

E - EXTERNAL PILOT PRESSURE

OMITTED - INTERNAL PILOT PRESSURE

SPOOL CONTROL MODIFICATIONS

(OMIT IF NOT REQUIRED)

1-STROKE ADJUSTMENTS

2-PILOT CHOKE ADJS.

3-PILOT CHOKE & STROKE ADJ

7-STROKE ADJ "A" END ONLY

8-STROKE ADJ "B" END ONLY

"X" - FAST RESPONSE MODEL

OMITTED - LOW SHOCK MODEL

ELECTRICAL PLUG FEATURE (OMIT IF NOT REQUIRED)

PA - INSTA-PLUG, MALE RECEPTACLE ONLY

PB - INSTA-PLUG, MALE & FEMALE RECEPTACLE

PA3 (3 PIN) & PA5 (5 PIN) RECEPTACLE THAT MEET
NFPA HYDRAULIC VALVE ELECTRICAL STANDARD
T3.5.29M-1980.

For satisfactory service life of these components in industrial applications, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from Vickers OFF, OFR, and OFRS series are recommended.

Litho in U. S. A.

●INCLUDED IN
941853 BODY S/A

*INCLUDED IN
942132 DETENT KIT

▲INCLUDED IN F3
PILOT VALVE SEAL
KIT 919214

VOLTAGE	SOLENOID S/A			
	S/A COMPLETE		COIL	
	STD	F3	STD	F3
115AC60	281291	317767	316011	317768
230AC60	281292	317769	298721	317770
460AC60	281293	317771	298722	317772

FOR ADDITIONAL SOLENOID S/A'S
SEE I-3544-S

●174638 SCREW (4 REQ'D) TORQUE
TO 7-9 lb. in. (0.8-1.0 N. m)

●IDENTIFICATION
PLATE

185645 SCREW (4 REQ'D)
TORQUE TO 19-23 lb. in.
(2.1-2.5 N. m)

USE ON "A"
OFFSET MODELS

●36212 SCREW
●286122 WIRE & GASKET S/A

236451 SPRING
294226 LIMITER (2 REQ'D)
▲262327 "C" RING
284931 GUIDE
▲262354 "O" RING

SCREW (SEE
MAIN STAGE
FOR BOLT KIT)

▲281545 GASKET
287968 COVER

USE ON "C, N, &
C-S163" MODELS

SOLENOID S/A
(SEE TABLE)

PUSH PIN	MODEL
213268	DG4S4-01*C/N/S163
220234	DG4S4-01*A/-S87

●7074 PLUG

●941853 BODY S/A
▲199811 "O" RING
(5 REQ'D) (NITRILE)

SPOOL (SEE TABLE)

MODEL	PUSH PIN
DG4S4-01*A/C/N/S87	213268
DG4S4-01**-S163	220234

211846 WASHER
ON "A" MODE

290072 SPRING U
ALL MODELS EXC

237976 SPR
"A" MODEL

281547 SPACER ("A"
ONLY-OMIT ON
& -S163 MOI

281

▲26

▲

185645 SCREW (4 REQ'D)
TORQUE TO 19-23
lb. in. (2.1-2.5 N. m)

236797 SNAP RING

281422 GUIDE

▲262354 "O" RING

▲262327 "O" RING

281423 WASHER

USE ON "C-S87"
MODELS

288159 SPACER "N" MODELS ONLY
(OMIT ON "C", S87, & S163 MODELS)

237976 SPRING ("N" MODELS ONLY)

290072 SPRING ("C", -S87, & -S163)

211846 WASHER (OMIT ON "N" MODELS)

VALVE MODEL CODE		SPOOL	I.D. PLATE W/ CIRCUIT DIAGRAM	
MAIN STAGE SPOOL	VALVE TYPE		A ONLY	B, C, N
DG5S4-100-	A/B/C N	364037	400975	400976
DG5S4-101-	B/C	*331404	—	400977
DG5S4-102-	A/B/C/N	364038	400975	400978
DG5S4-103-	B, C	*277479	—	400979
DG5S4-104-		281193	—	400980
DG5S4-106-	A/B/C/N	364039	400975	400981
DG5S4-108-	B/C	364041	—	400980
DG5S4-109-	A/B/C/N	277563	400975	400976
DG5S4-1031-	B/C	*277479	—	580475
DG5S4-1033-	A/B/C/N	364042	400975	400981

*ASSEMBLE TYPE 1 & 3 SPOOLS WITH NARROW CENTER LAND TOWARD 'A' END OF VALVE. 'A' END OF VALVE IS DEFINED AS BEING CLOSEST TO CYLINDER PORT 'A'. THE TYPE 31 SPOOL IS INSTALLED IN REVERSE OF TYPE '3', WITH NARROW CENTER LAND TOWARD 'B' END OF VALVE.

PILOT ATTACHING PARTS		
MODEL	BOLT (4 REQ'D)	L'WASHER (4 REQ'D)
W/OUT PILOT CHOKE	□ 1034	▣ 68907
W/ PILOT CHOKE (SEE BACK PAGE)	▣ 10938	
TORQUE TO 100-112 lb. in. (11.3-12.7 N. m)		

THIS SOLENOID REMOVED
ON "A" & "B" MODELS
(RIGHT HAND)

PILOT ATTACHING BOLTS (S)

■*7074 PLUG (REM
INTERNAL PILOT
IN MODEL C)

■*407533 F
▲263493 'C'

416834 RIVET (4 REQ'D)

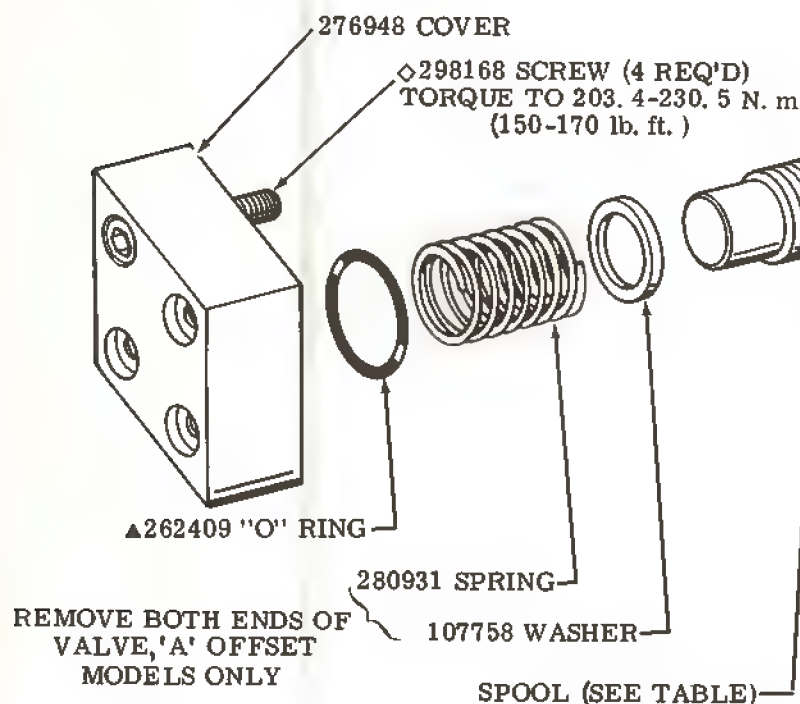
ID PLATE W/CIRCUIT
DIAGRAM (SEE TABLE)

◆400959 BODY STD
◆435503 BODY CHECK VLV.}

▲263493 "O" RING

■*407533 PLUG

PLUG INSTALLATION TABLE			
MODEL	PLUG "A"	PLUG "B"	PLUG "C"
DG5S4-10**-53	DOES NOT EXIST	30560	OUT
DG5S4-10**-E-53		7074	30560
DG5S4-10**-X-53		OUT	OUT
DG5S4-10**-X-E-53			
DG5S4-10**-K/L/R/S-53	161809	7074	30560
DG5S4-10**-E-K/L/R/S-53	113000		OUT
DG5S3-10**-X-K/L/R/S-53	OUT		
DG5S4-10**-X-E-K/L/R/S-53	113000		



■*407533 PLUG

▲263493 "O" RING

■*C PLUG (SEE TABLE)

▲154014 "O" RING (NITRILE)

◆■*A PLUG (SEE TABLE)

◆▲263493 "O" RING

◆■*407533 PLUG

◆245802 SLEEVE (PRESS IN PLACE)

MODEL	SPRING
DG5S4-10**-K-53	◆2472
DG5S4-10**-L-53	◆2472
DG5S4-10**-R-53	◆2764
DG5S4-10**-S-53	◆4323

- ▲▲ INCLUDED IN F3 SEAL KIT 920213
- ◇ INCLUDED IN FASTENER KIT 941262
- INCLUDED IN BOLT KIT 255633
- ▣ INCLUDED IN BOLT KIT 255654
- * INCLUDED IN PLUG KIT 941263
- PLUG TORQUES (SEE TABLE)
- ◆ NOT AVAILABLE FOR SALE
- ◆ USED ON CHECK VALVE MODELS ONLY

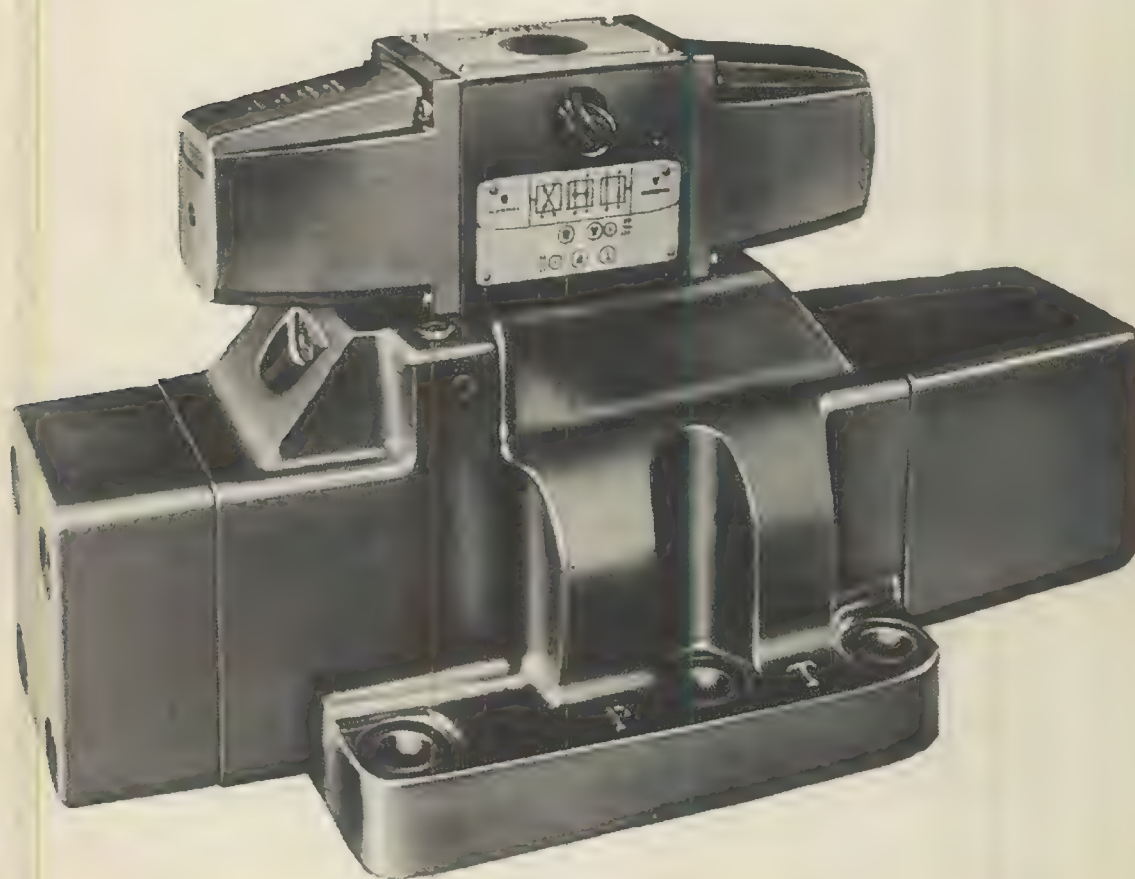
NOTE
PARTS INCLUDED IN SERVICE
KITS NOT SOLD SEPARATELY

◆6422 POP
◆289102

Service Parts Information

**Air Gap
Solenoid Controlled
Pilot Operated
Directional
Control Valves**

DG5S4-10*A-*-53
DG5S4-10*B-*-53
DG5S4-10*C-*-53
DG5S4-10*N-*-53



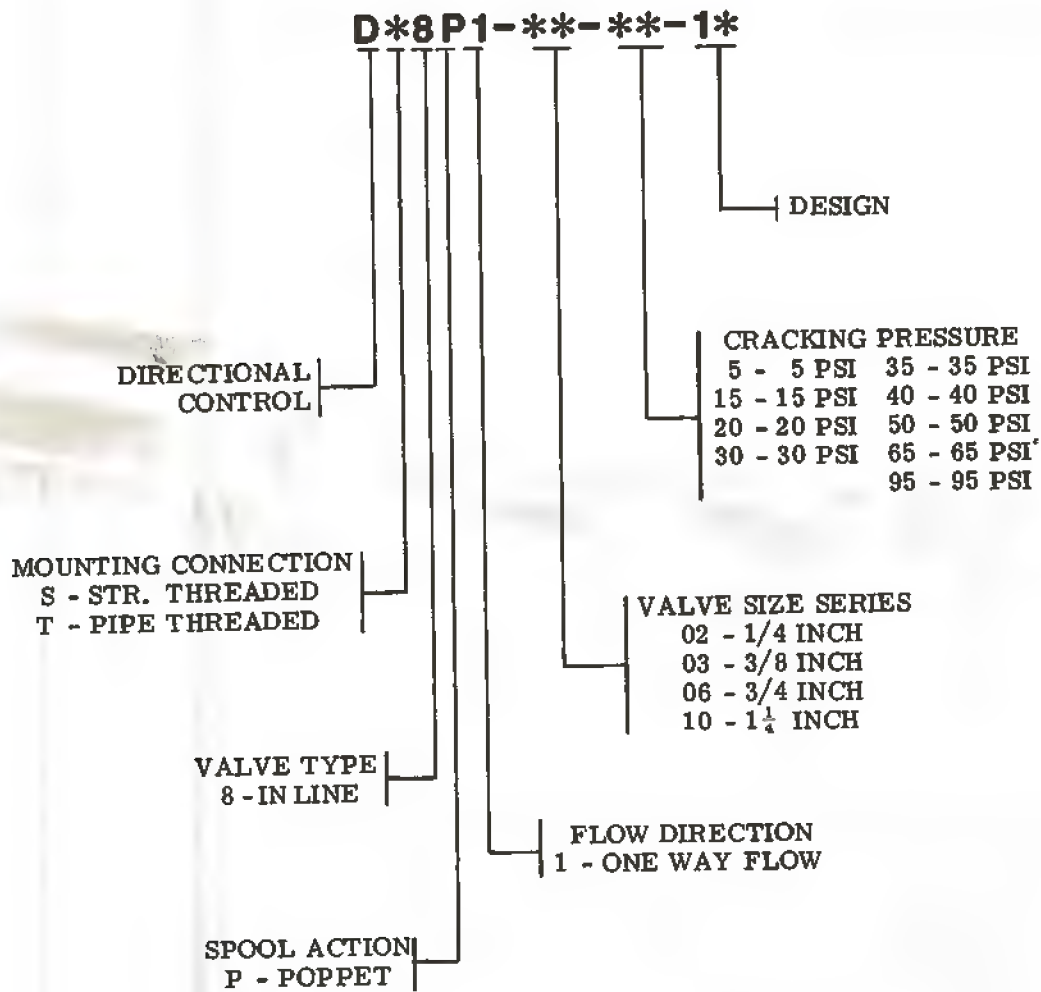
Vickers, Incorporated

1401 Crooks Road
Troy, Michigan 48064

Revised 9-1-86

I-3624-S

MODEL CODE BREAKDOWN



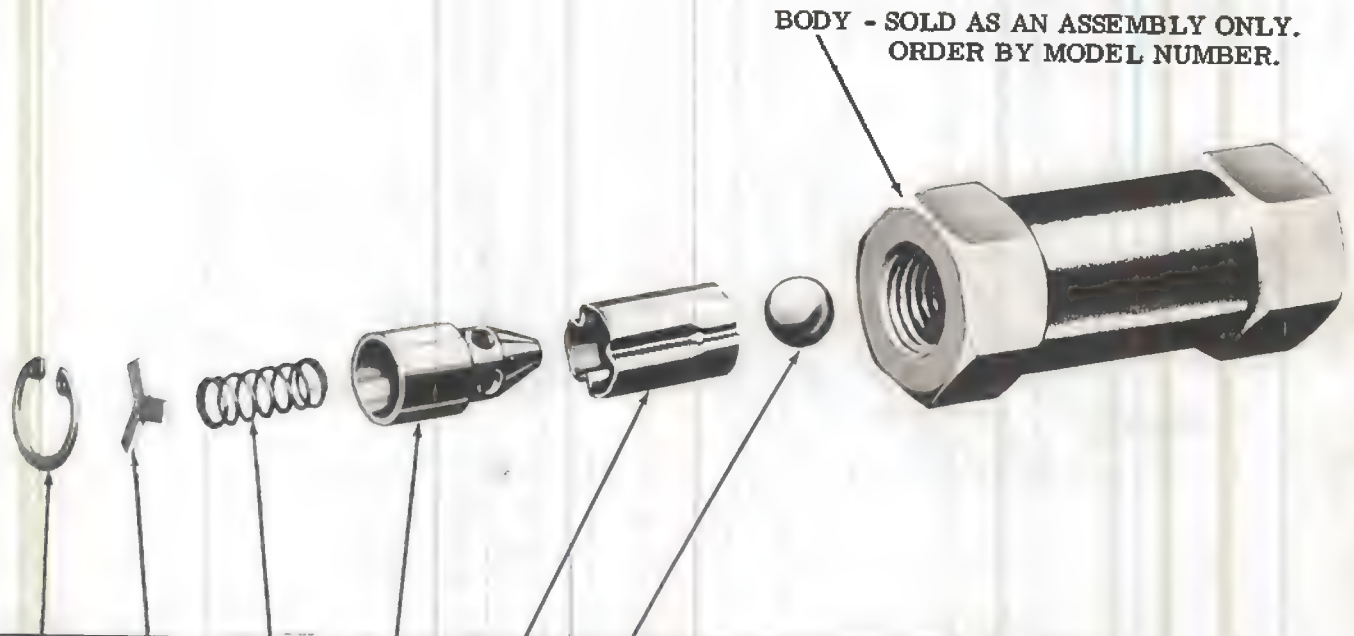
For satisfactory service life of these components in industrial applications, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from Vickers OFF, OFR, and OFRS series are recommended.

Service Parts Information

INLINE
CHECK
VALVE

DT8P1-10/-11
DS8P1-10/-11

VICKERS.
ATRIGNOVA COMPANY



RET. RING	WASHER	SPRING	POPPET	SLEEVE	BALL	PIPE SIZE	CRACKING PRESSURE P. S. I.	MODEL
92733	113714	113559	—	113715	1651	1/4	5	DT8P1-02-5-10
		216999					30	DT8P1-02-30-10
		114094					65	DT8P1-02-65-10
106642	123740	123761	123737	—	—	3/8	5	D*8P1-03-5-10
		217000					30	DT8P1-03-30-10
		123760					65	D*8P1-03-65-10
98702	125673	125779	125674	—	—	3/4	5	D*8P1-06-5-11
		222541					15	D*8P1-06-15-11
		418556					20	DT8P1-06-20-11
		216998					30	D*8P1-06-30-11
		425262					40	DT8P1-06-40-11
		580963					50	DT8P1-06-50-11
		125780					65	D*8P1-06-65-11
		125631					5	D*8P1-10-5-11
113752	125635	312094	125634	—	—	1-1/4	15	DT8P1-10-15-11
		216548					30	DT8P1-10-30-11
		257354					50	DT8P1-10-50-11
		125632					65	D*8P1-10-65-11
		582338					95	DT8P1-10-95-11

Vickers, Incorporated
P.O. Box 302
Troy, Michigan 48007-0302

Revised 5-1-85

I-953-S

155

MODEL CODE BREAKDOWN

(F3)-DG PC-06 D*(*)-51

SEALS FOR MINERAL OIL
AND FIRE RESISTANT FLUIDS

DIRECTIONAL CONTROL
MANIFOLD OR SUBPLATE
MOUNTED

PRESSURE OPERATED
CHECK MODULE

3/4 INCH SIZE

DESIGN

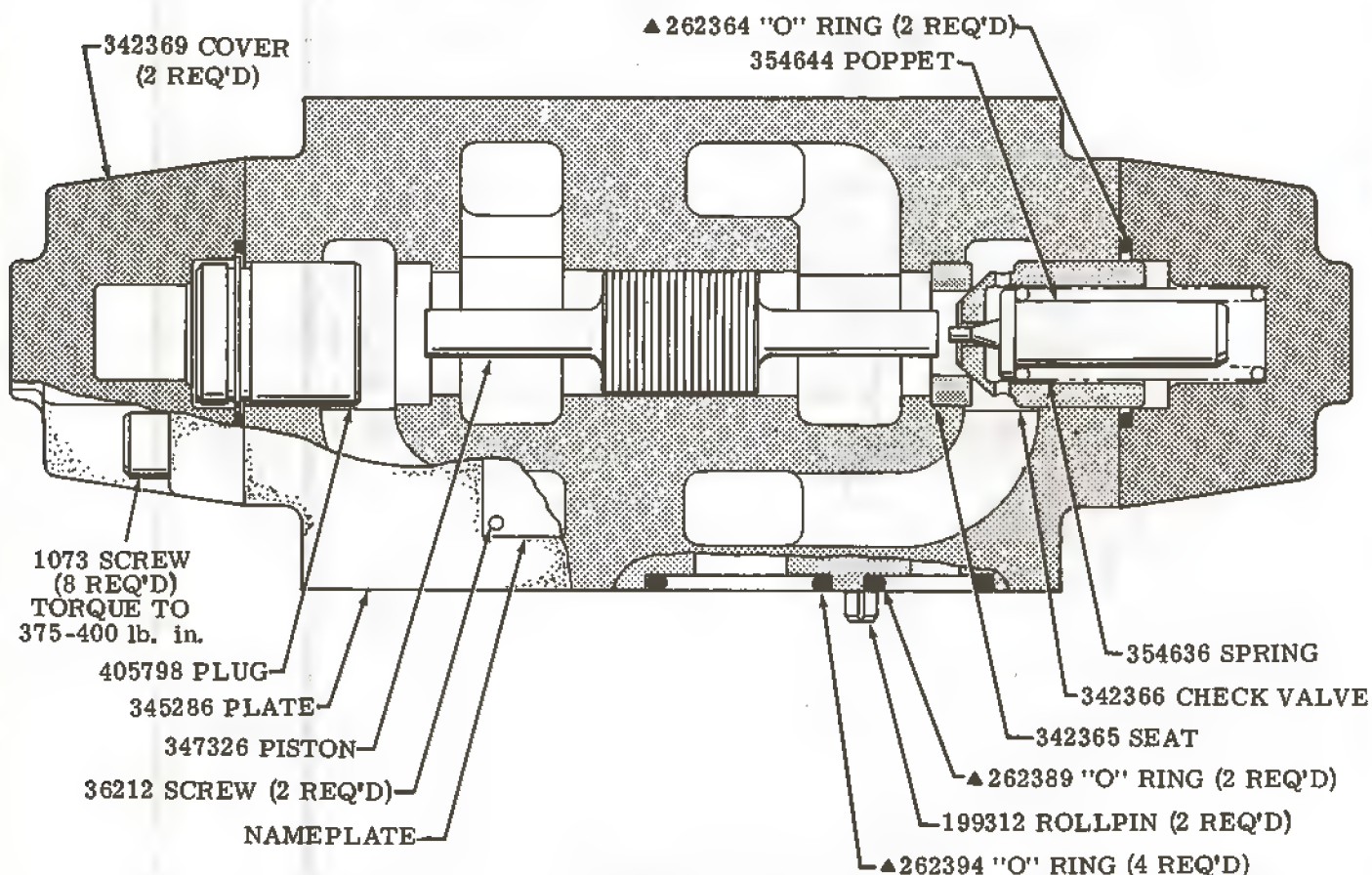
CHECK VALVE CRACKING PRESSURE
(OMIT FOR 30 PSIG STANDARD)

CHECK VALVE IN CYLINDER PORT
A - CYLINDER PORT A
B - CYLINDER PORT B

DECOMPRESSION FEATURE

NOTE

DGPC-06-DA*-51 VALVE SHOWN. FOR DGPC-06-DB*-51 VALVES, CHECK VALVE PARTS AND PLUG ARE ASSEMBLED ON OPPOSITE ENDS OF VALVE.



NOTE

REFER TO INSTALLATION DRAWING 522650 FOR BOLT KIT INFORMATION AND MODULE STACKING DATA. THE MOUNTING BOLT TORQUE SHOULD NOT EXCEED A MAXIMUM OF 700 lb. in.

▲SERVICE UNITS WITH
F3 SEAL KIT 920216

Service Parts Information

**PRESSURE OPERATED
CHECK VALVE MODULE
WITH DECOMPRESSION
FEATURE**

DGPC-06D*(*)-51

DGPC-01D*(*)-51

VICKERS

ATRIHOVA COMPANY

MODEL CODE BREAKDOWN

(F3)-DGPC-01D*(*)-51

SEALS FOR MINERAL OIL
AND FIRE RESISTANT FLUIDS

DIRECTIONAL CONTROL
MANIFOLD OR SUBPLATE
MOUNTED

PRESSURE OPERATED
CHECK MODULE

1/8 INCH SIZE

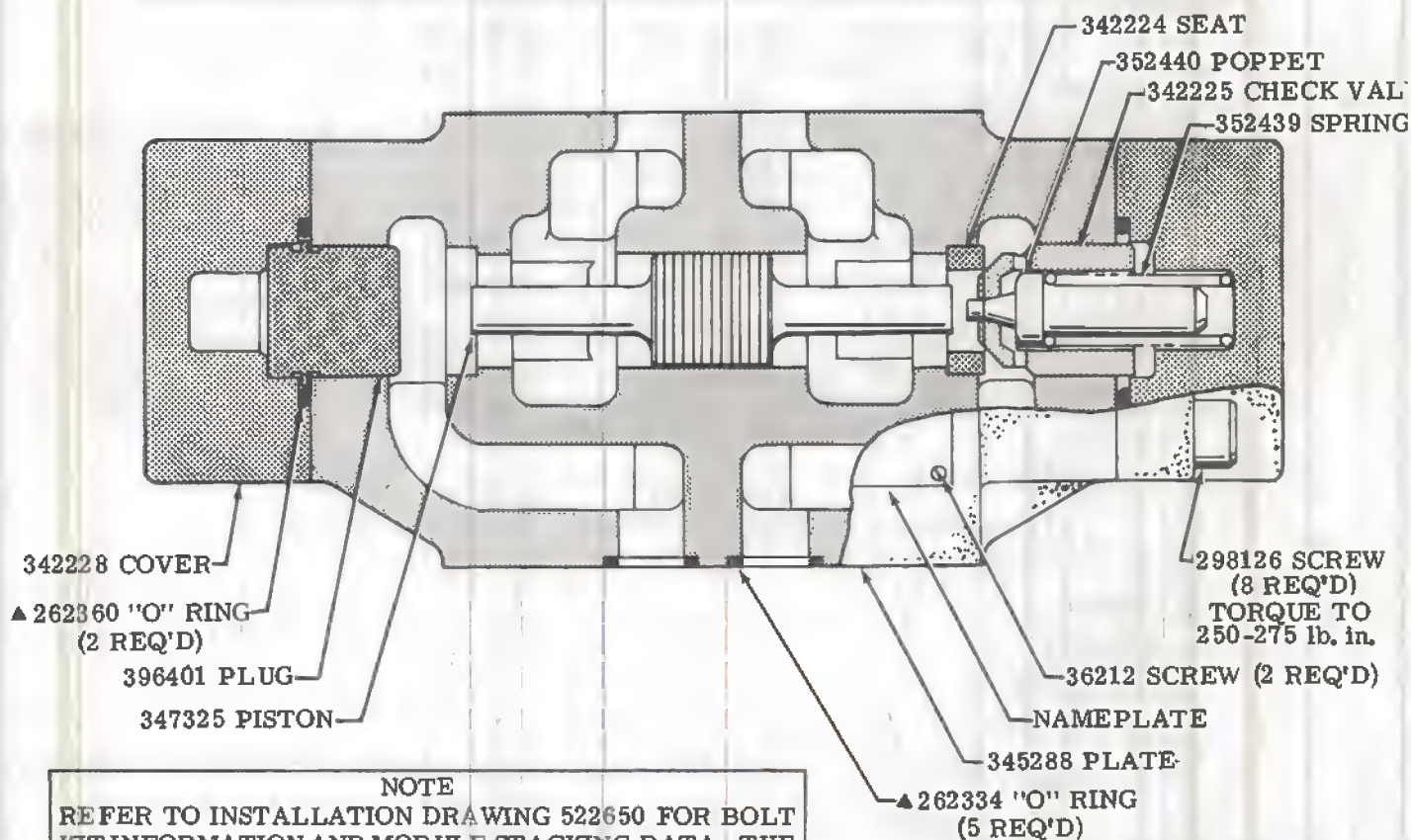
DECOMPRESSION FEATURE

DESIGN

CHECK VALVE CRACKING PRESSURE
(OMIT FOR 30 PSIG STANDARD)

CHECK VALVE IN CYLINDER PORT
A - CYLINDER PORT A
B - CYLINDER PORT B

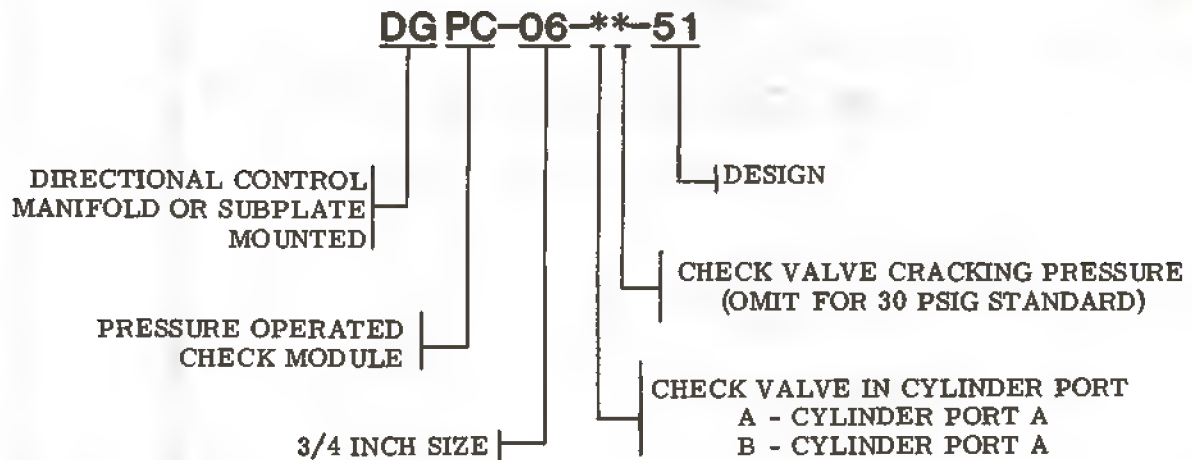
NOTE
DGPC-01-DA*-51 VALVE SHOWN. FOR DGPC-01-DB*-51 VALVES, CHECK VALVE PARTS AND PLUG ARE ASSEMBLED ON OPPOSITE ENDS OF VALVE.



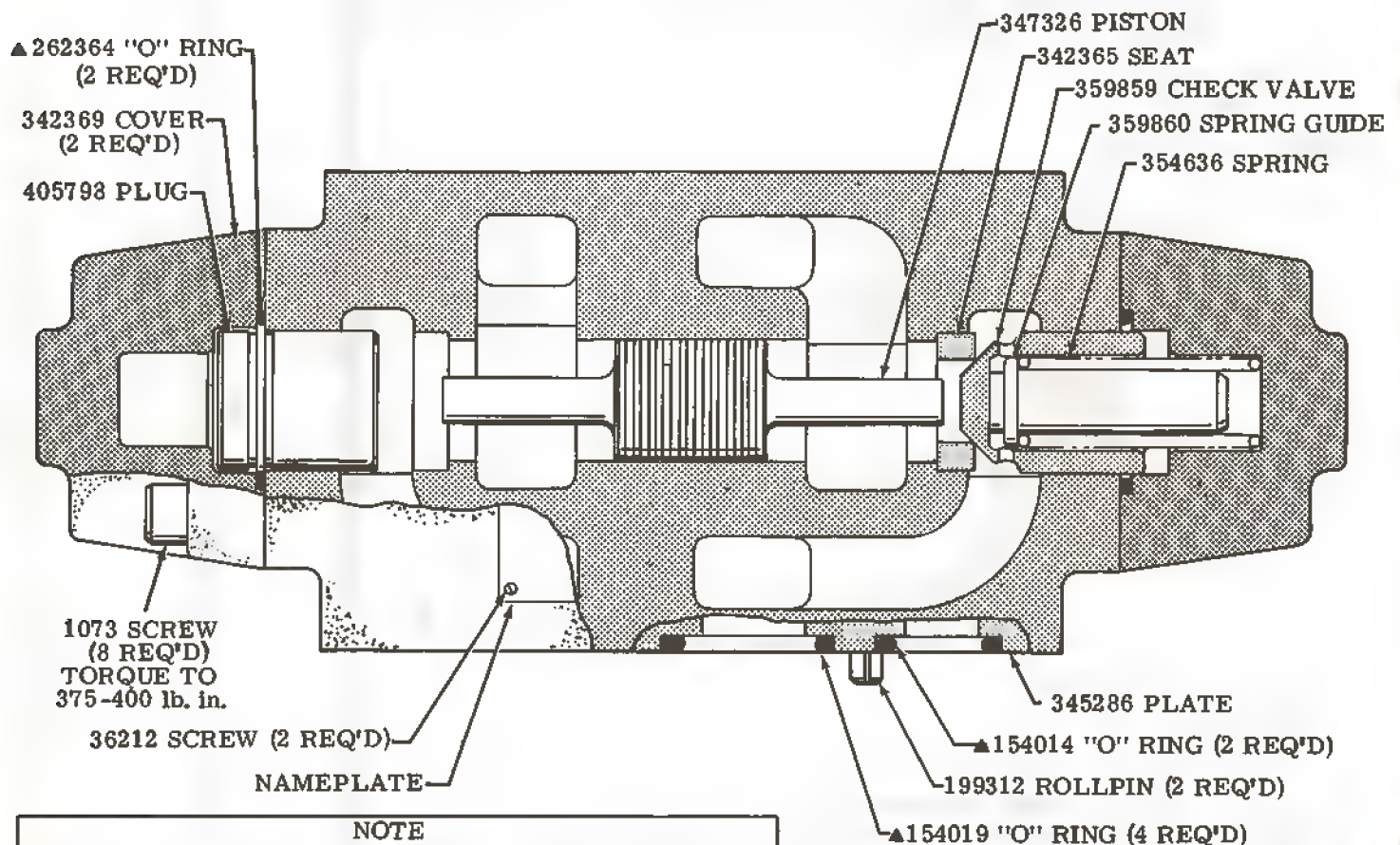
NOTE
REFER TO INSTALLATION DRAWING 522650 FOR BOLT KIT INFORMATION AND MODULE STACKING DATA. THE MOUNTING BOLT TORQUE SHOULD NOT EXCEED A MAXIMUM OF 112 lb. in.

▲ SERVICE UNITS WITH
F3 SEAL KIT 920215

MODEL CODE BREAKDOWN



NOTE
DGPC-06-A*-51 VALVE SHOWN. FOR DGPC-06-B*-51 VALVES, CHECK VALVE PARTS AND PLUG ARE ASSEMBLED ON OPPOSITE ENDS OF VALVE.



NOTE
REFER TO INSTALLATION DRAWING 522650 FOR BOLT KIT INFORMATION AND MODULE STACKING DATA. THE MOUNTING BOLT TORQUE SHOULD NOT EXCEED A MAXIMUM OF 700 lb. in.

▲SERVICE UNIT WITH
F3 SEAL KIT 920216

Service Parts Information

**PRESSURE
OPERATED
CHECK
VALVES**

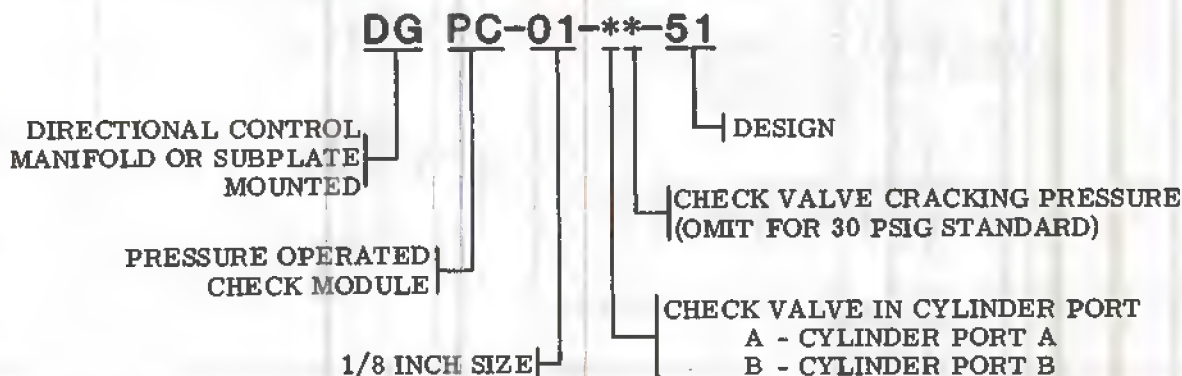
DGPC-06-**-51

DGPC-01-**-51

VICKERS

A TRIMONA COMPANY

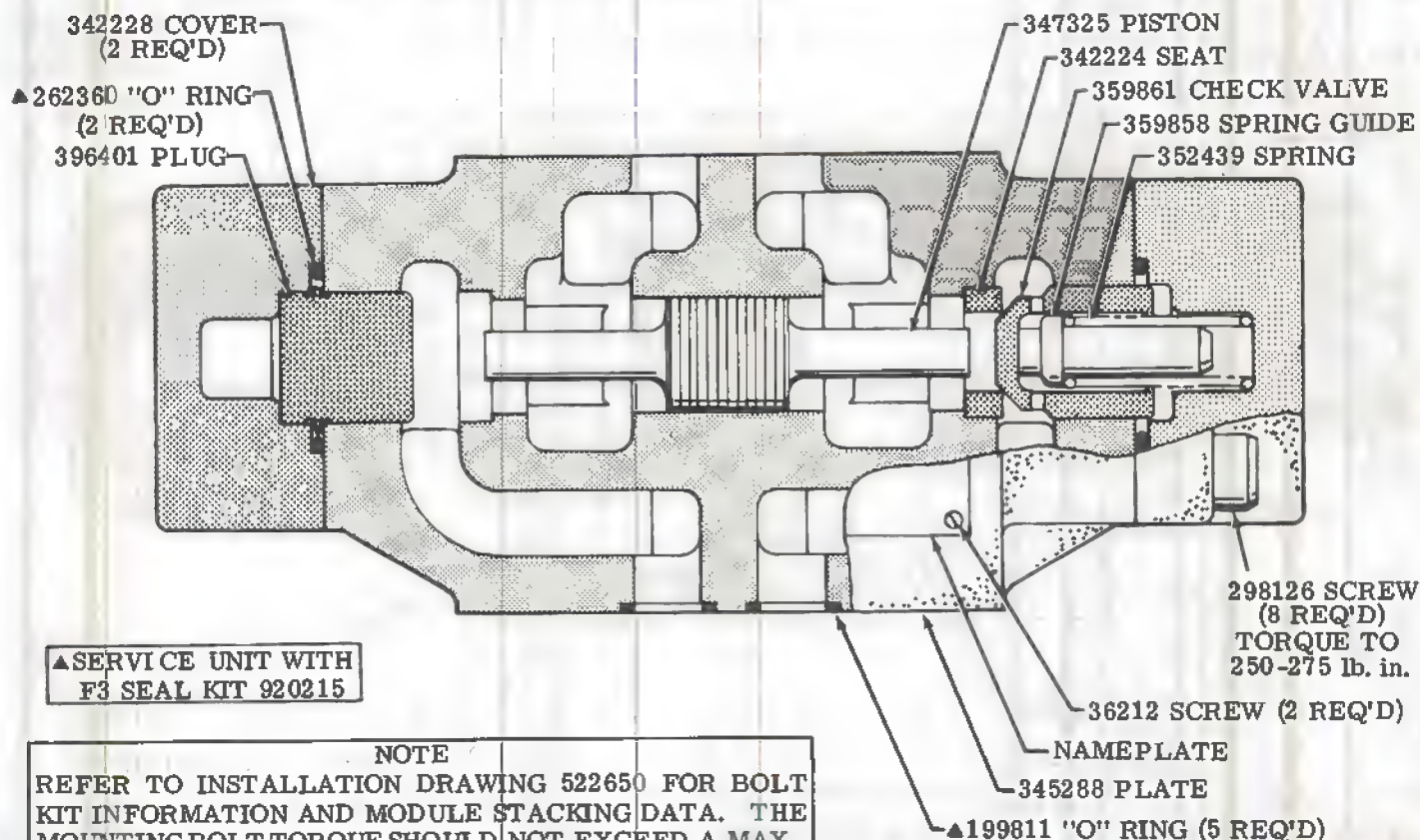
MODEL CODE BREAKDOWN



DGPC-01-A*-51 VALVE SHOWN.

NOTE

FOR DGPC-01-B*-51 VALVES, CHECK VALVE PARTS AND PLUG ARE ASSEMBLED ON OPPOSITE ENDS OF VALVE.



NOTE

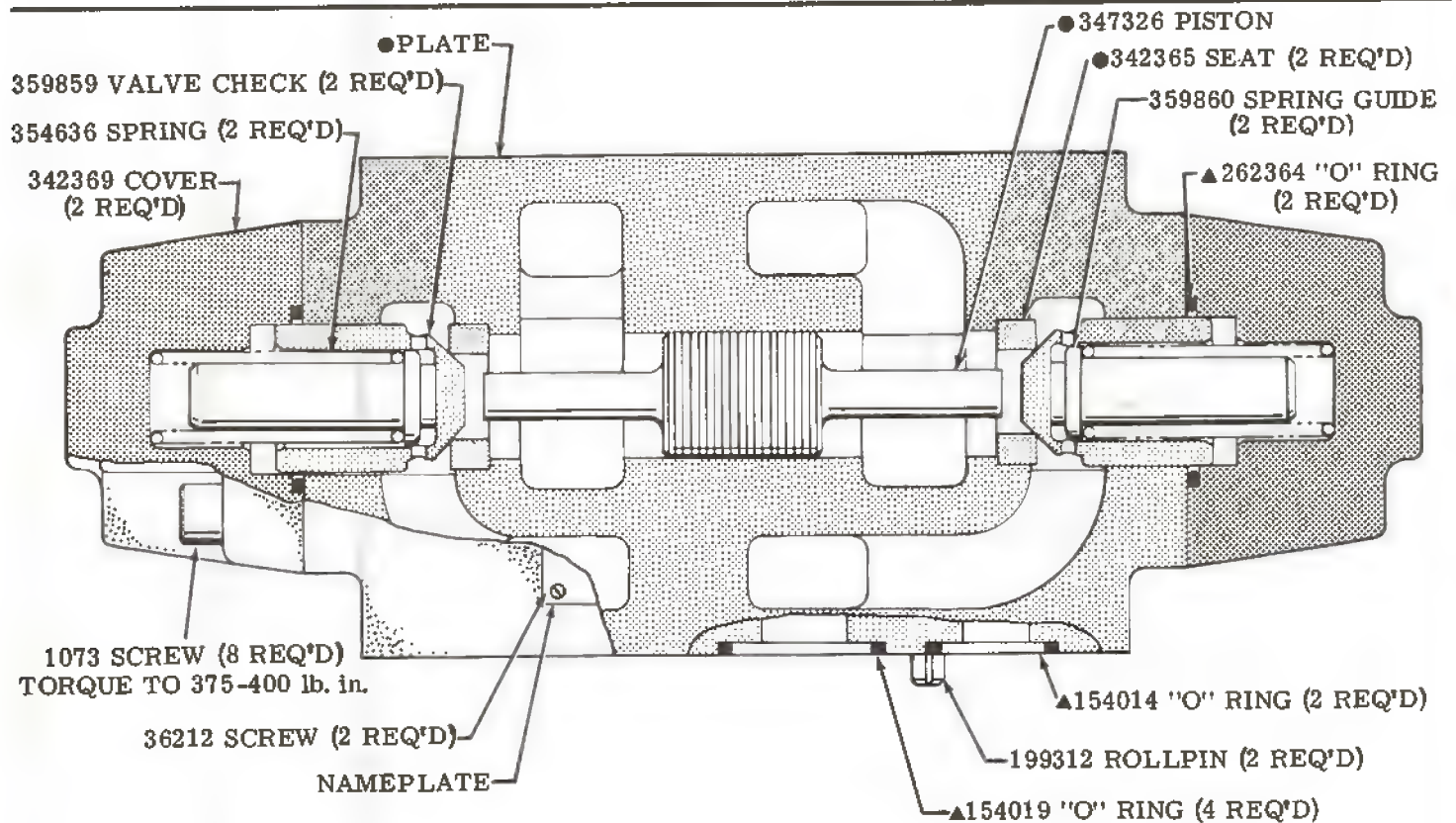
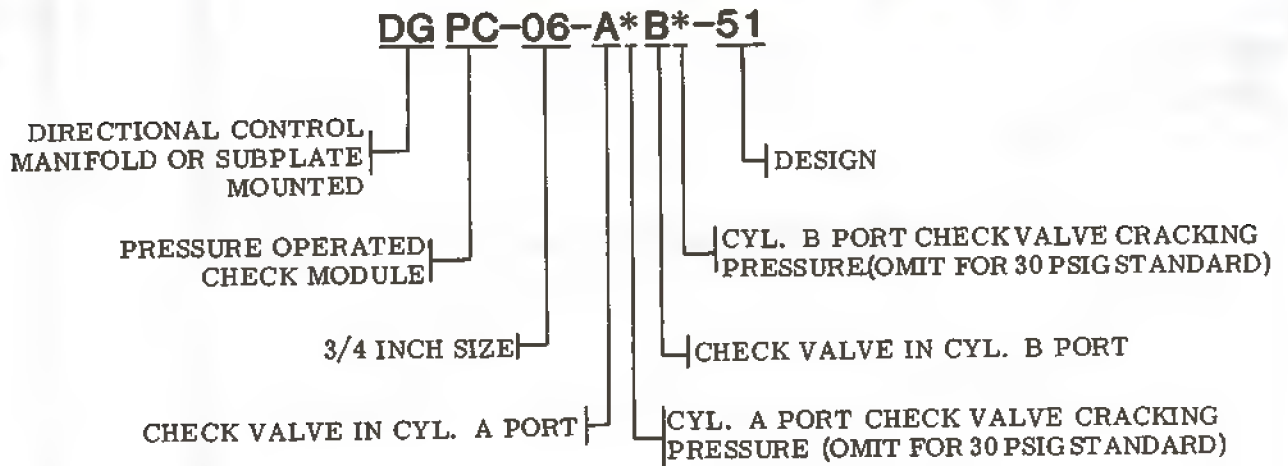
REFER TO INSTALLATION DRAWING 522650 FOR BOLT KIT INFORMATION AND MODULE STACKING DATA. THE MOUNTING BOLT TORQUE SHOULD NOT EXCEED A MAXIMUM OF 112 lb. in.

Vickers, Incorporated
P.O. Box 302
Troy, Michigan 48007-0302

Revised 5-1-85

I-3397-S

MODEL CODE BREAKDOWN



CAUTION
THIS VALVE CANNOT BE USED WITH PRESSURE CENTERED OR DG-18 AIR OPERATED VALVES.

NOTE
REFER TO INSTALLATION DRAWING 522650 FOR BOLT KIT INFORMATION AND MODULE STACKING DATA. THE MOUNTING BOLT TORQUE SHOULD NOT EXCEED A MAXIMUM OF 700 lb. in. SUBPLATE INFORMATION IS TABULATED ON PARTS DRAWING I-3381-S.

▲ INCLUDED IN F3
SEAL KIT 920216

● INCLUDED IN
349164 BODY S/A

Litho in U. S. A.

Service Parts Information

**PRESSURE
OPERATED
CHECK VALVES**

DGPC-01-A*B*-51
DGPC-06-A*B*-51

VICKERS.

A TRIMONA COMPANY

MODEL CODE BREAKDOWN

DGPC-01-A*B*-51

DIRECTIONAL CONTROL
MANIFOLD OR SUBPLATE
MOUNTED

PRESSURE OPERATED
CHECK MODULE

1/8 INCH SIZE

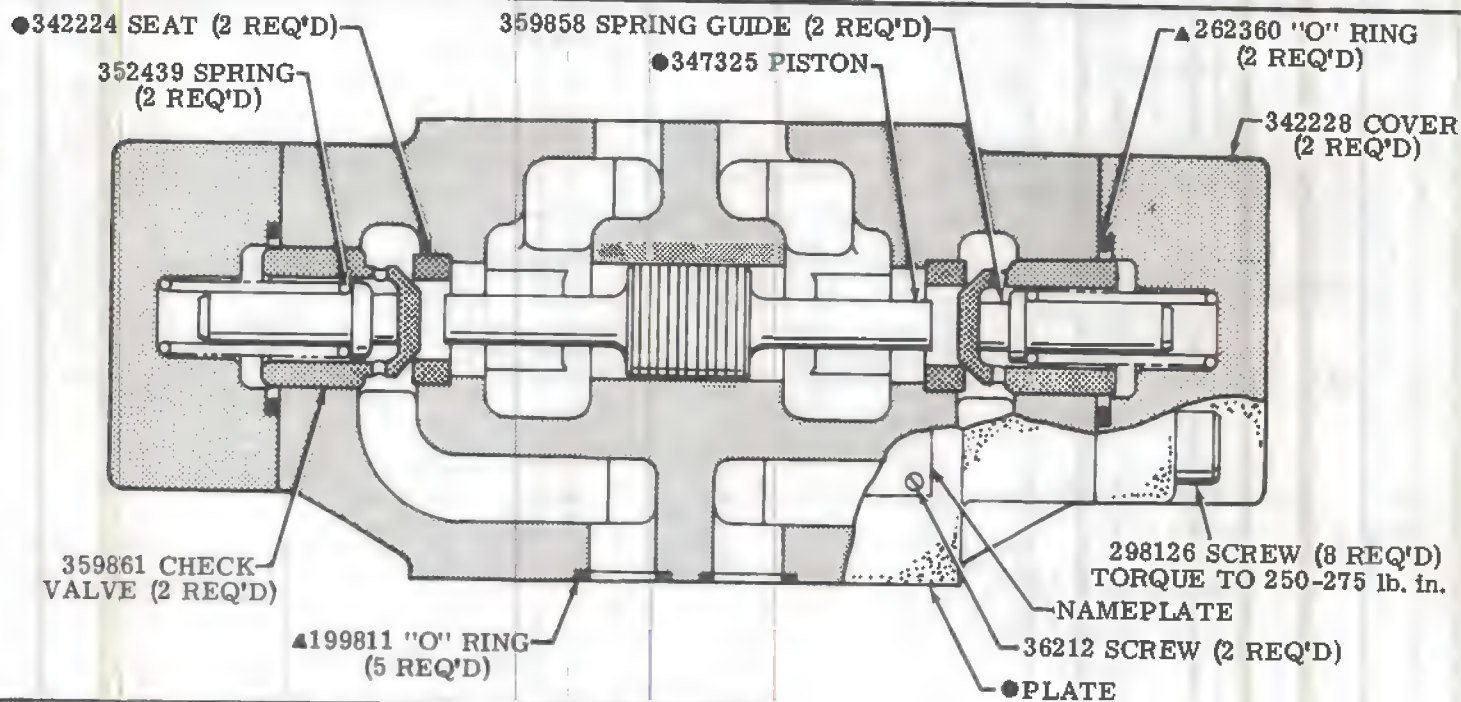
CHECK VALVE IN
CYLINDER A PORT

DESIGN

CYL. B PORT CHECK VALVE CRACKING
PRESSURE (OMIT FOR 30 PSIG STANDARD)

CHECK VALVE IN CYL. B PORT

CYL. A PORT CHECK VALVE CRACKING
PRESSURE (OMIT FOR 30 PSIG STANDARD)



CAUTION

THIS VALVE CANNOT BE USED WITH PRESSURE CENTERED OR DG-18 AIR OPERATED VALVES.

NOTE

REFER TO INSTALLATION DRAWING 522650 FOR BOLT KIT INFORMATION AND MODULE STACKING DATA. THE MOUNTING BOLT TORQUE SHOULD NOT EXCEED A MAXIMUM OF 112 lb. in. SUBPLATE INFORMATION IS TABULATED ON PARTS DRAWING I-3381-S.

●INCLUDED IN
347456 BODY S/A

▲INCLUDED IN F3
SEAL KIT 920215

Vickers, Incorporated
P.O. Box 302
Troy, Michigan 48007-0302

Revised 11-1-85

I-3396-S

MODEL CODE BREAKDOWN

(F3)-DG PC-06-DA*DB*-51

SEALS FOR MINERAL OIL AND
FIRE RESISTANT FLUIDS

DIRECTIONAL CONTROL
GASKET MOUNTED

PRESSURE OPERATED
CHECK MODULE

3/4 INCH SIZE

DECOMPRESSION FEATURE

DESIGN

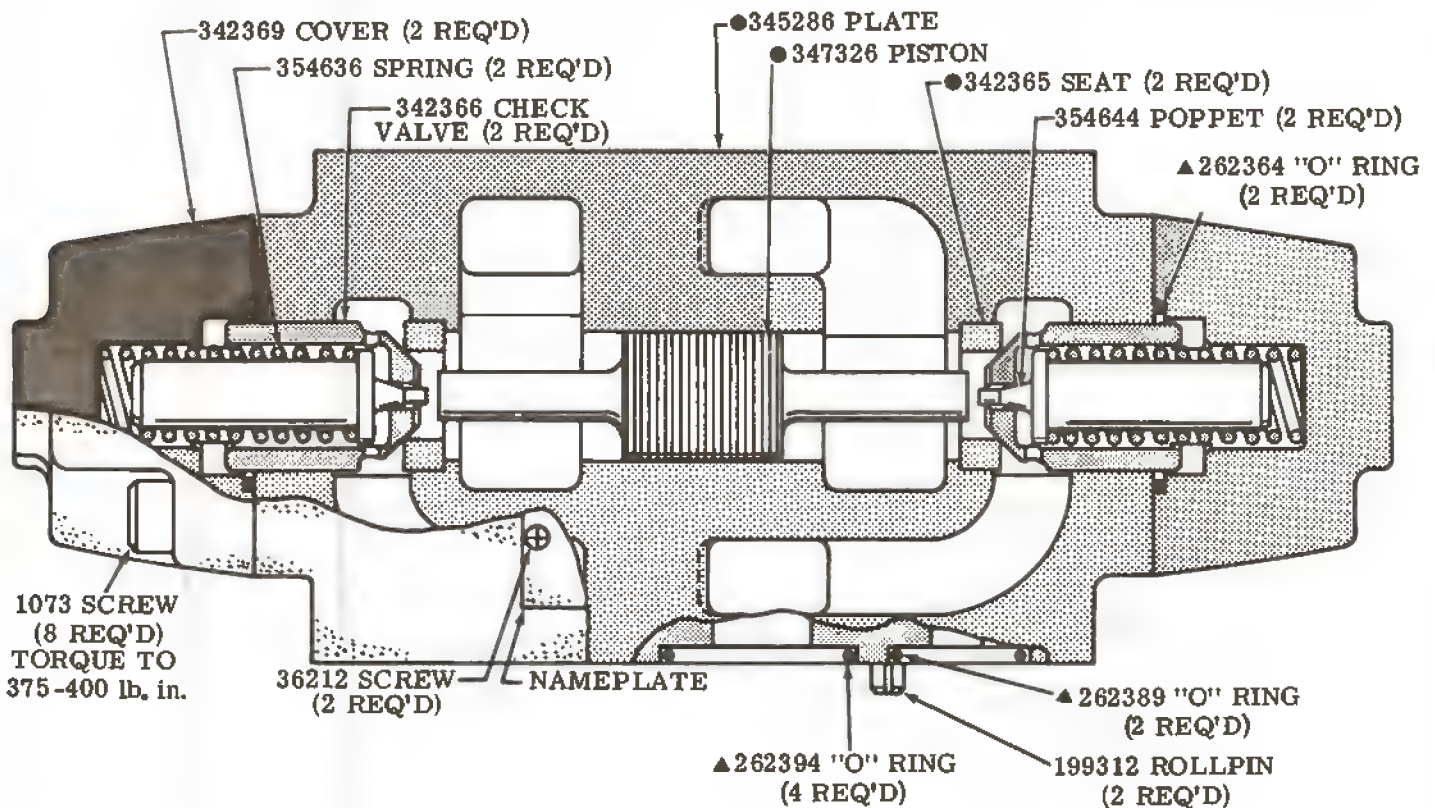
CHECK VALVE CRACKING
PRESSURE CYL. PORT B
STANDARD 30 PSI
(OMIT FOR STANDARD)

CHECK VALVE IN CYL. PORT B

DECOMPRESSION FEATURE

CHECK VALVE CRACKING PRESSURE
CYL. PORT A STANDARD 30 PSI
(OMIT FOR STANDARD)

CHECK VALVE IN CYL. PORT A



NOTE

REFER TO INSTALLATION DRAWING 522650 FOR BOLT KIT INFORMATION AND MODULE STACKING DATA. THE MOUNTING BOLT TORQUE SHOULD NOT EXCEED A MAXIMUM OF 700 lb. in.

▲SERVICE UNITS WITH
F3 SEAL KIT 920216

●INCLUDED IN
349164 SUBASSY

Litho in U. S. A.

Service Parts Information

**PRESSURE OPERATED
CHECK VALVE MODULE
WITH DECOMPRESSION
FEATURE**

DGPC-06-DA*DB*-51

DGPC-01-DA*DB*-51

VICKERS.

A TRIMONA COMPANY

MODEL CODE BREAKDOWN

(F3)-DG PC-01-DA*DB*-51

SEALS FOR MINERAL OIL
AND FIRE RESISTANT FLUIDS

DIRECTIONAL CONTROL
GASKET MOUNTED

PRESSURE OPERATED
CHECK MODULE

1/8 INCH SIZE

DECOMPRESSION FEATURE

CHECK VALVE IN CYL. PORT A

DESIGN

CHECK VALVE CRACKING
PRESSURE CYLINDER PORT B
STANDARD 30 PSI
(OMIT FOR STANDARD)

CHECK VALVE IN CYL. PORT B

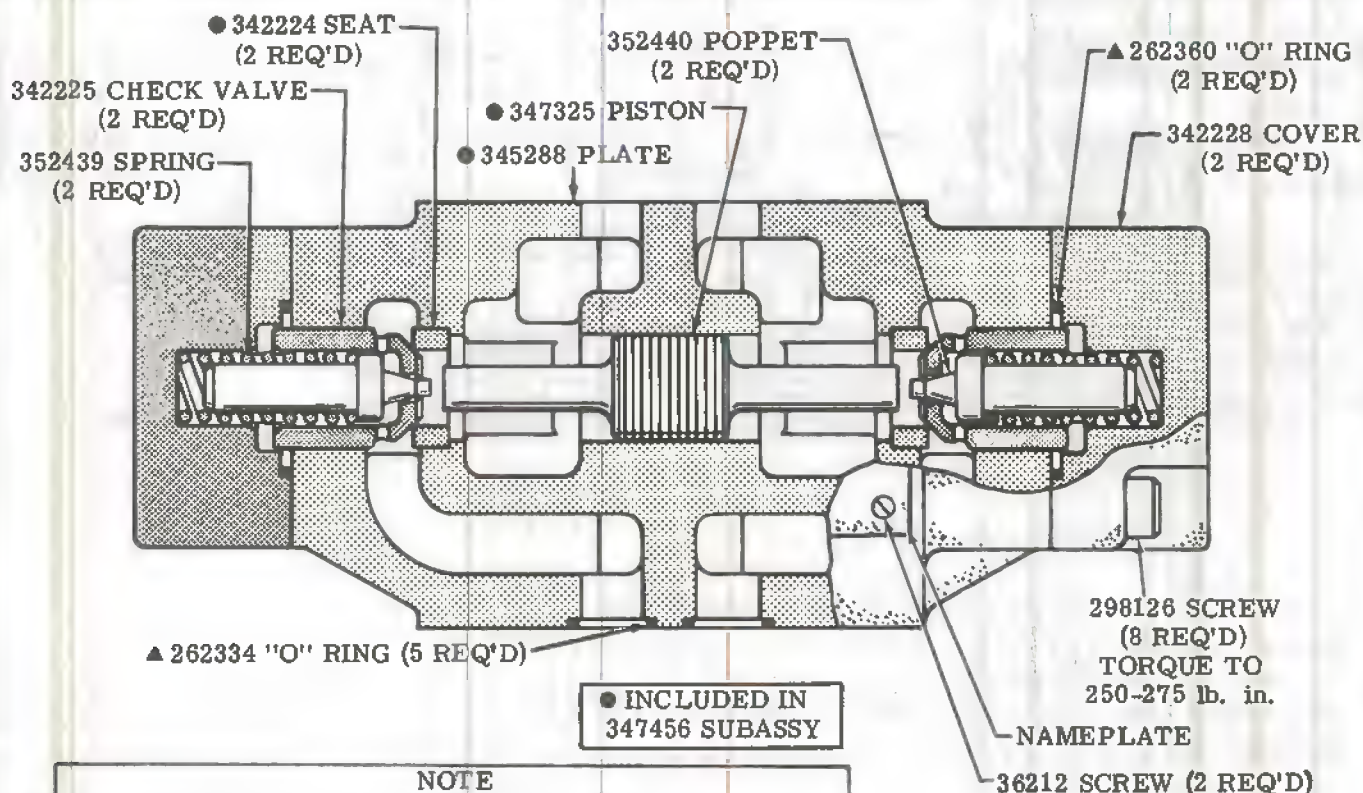
DECOMPRESSION FEATURE

CHECK VALVE CRACKING PRESSURE

CYLINDER PORT A

STANDARD 30 PSI

(OMIT FOR STANDARD)

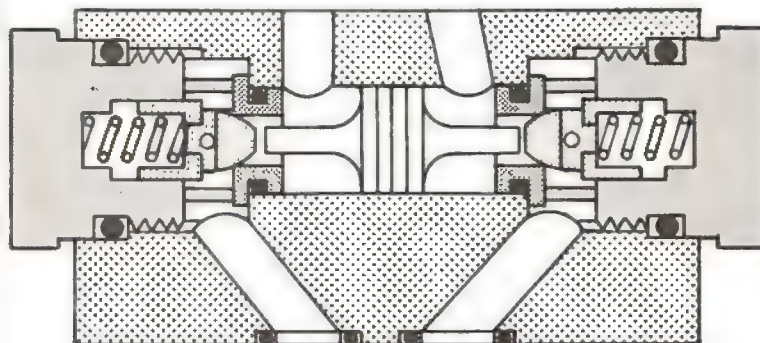
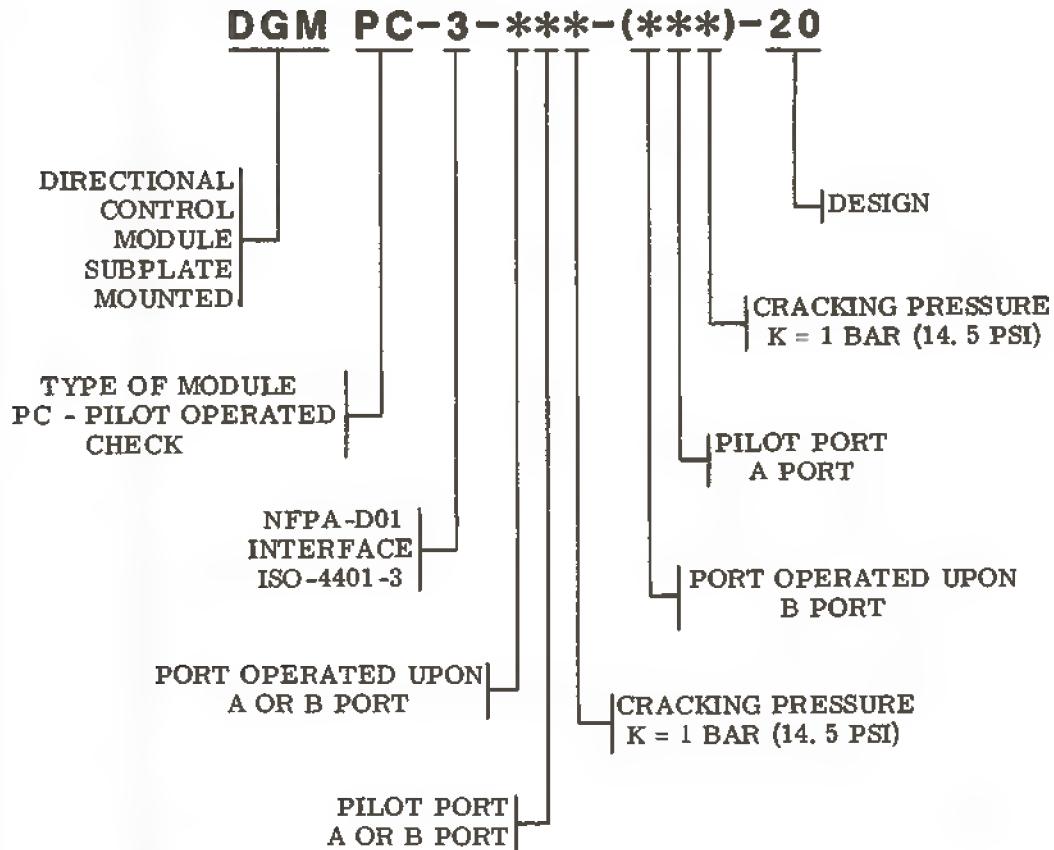


NOTE

REFER TO INSTALLATION DRAWING 522650 FOR BOLT KIT INFORMATION AND MODULE STACKING DATA. THE MOUNTING BOLT TORQUE SHOULD NOT EXCEED A MAXIMUM OF 112 lb. in.

▲ SERVICE UNITS WITH
F3 SEAL KIT 920215

MODEL CODE BREAKDOWN



For satisfactory service life of these components in industrial applications, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from Vickers OFP, OFR, and OFRS series are recommended.

Litho in U. S. A.

Service Parts Information

VICKERS

ATRIUM COMPANY

PILOT OPERATED CHECK VALVE MODULES

DGMPC-3-***-(***)-20

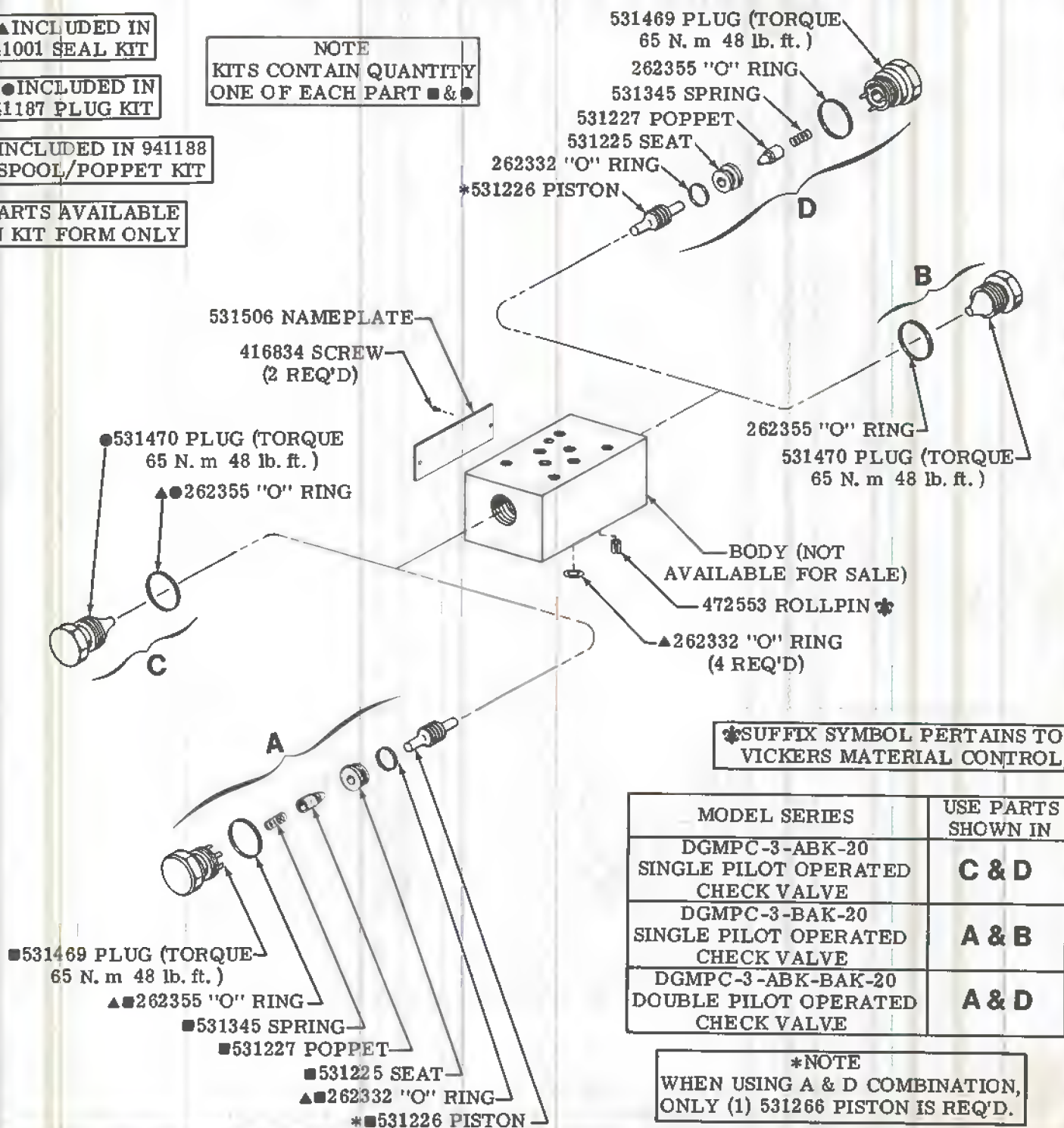
▲ INCLUDED IN
941001 SEAL KIT

● INCLUDED IN
941187 PLUG KIT

■ INCLUDED IN 941188
SPOOL/POPPET KIT

PARTS AVAILABLE
IN KIT FORM ONLY

NOTE
KITS CONTAIN QUANTITY
ONE OF EACH PART ■ & ●



*SUFFIX SYMBOL PERTAINS TO
VICKERS MATERIAL CONTROL

MODEL SERIES	USE PARTS SHOWN IN
DGMPC-3-ABK-20 SINGLE PILOT OPERATED CHECK VALVE	C & D
DGMPC-3-BAK-20 SINGLE PILOT OPERATED CHECK VALVE	A & B
DGMPC-3-ABK-BAK-20 DOUBLE PILOT OPERATED CHECK VALVE	A & D

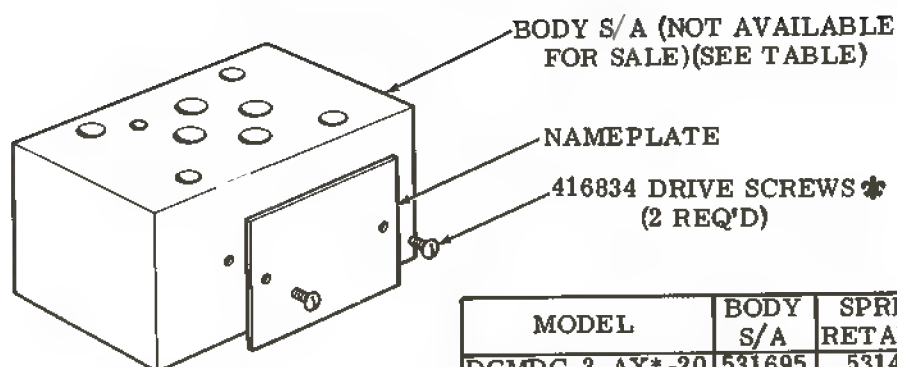
*NOTE
WHEN USING A & D COMBINATION,
ONLY (1) 531266 PISTON IS REQ'D.

Vickers, Incorporated
P.O. Box 302
Troy, Michigan 48007-0302

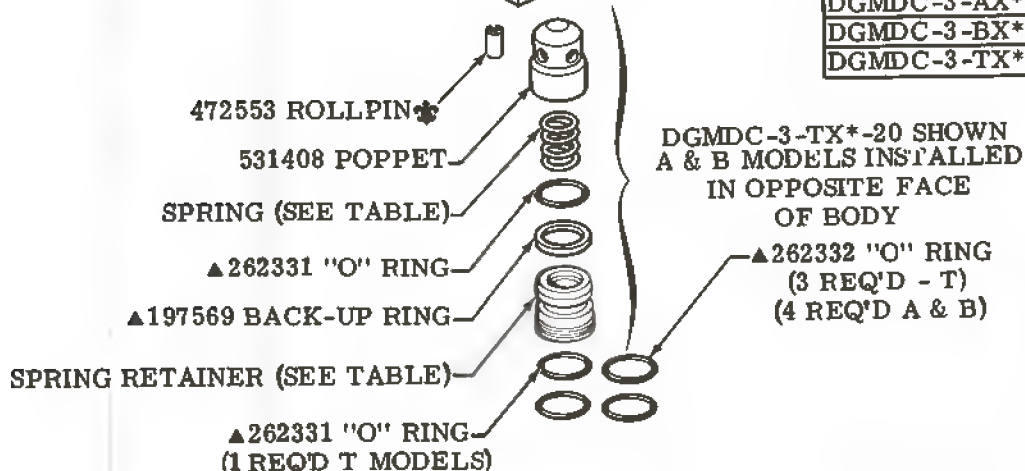
Revised 5-1-85

I-3388-S

MODEL	SPRING
DGMDC-3-*XL-20	531404
DGMDC-3-*XR-20	531405



MODEL	BODY S/A	SPRING RETAINER
DGMDC-3-AX*-20	531695	531406
DGMDC-3-BX*-20	531696	531406
DGMDC-3-TX*-20	531493	531492



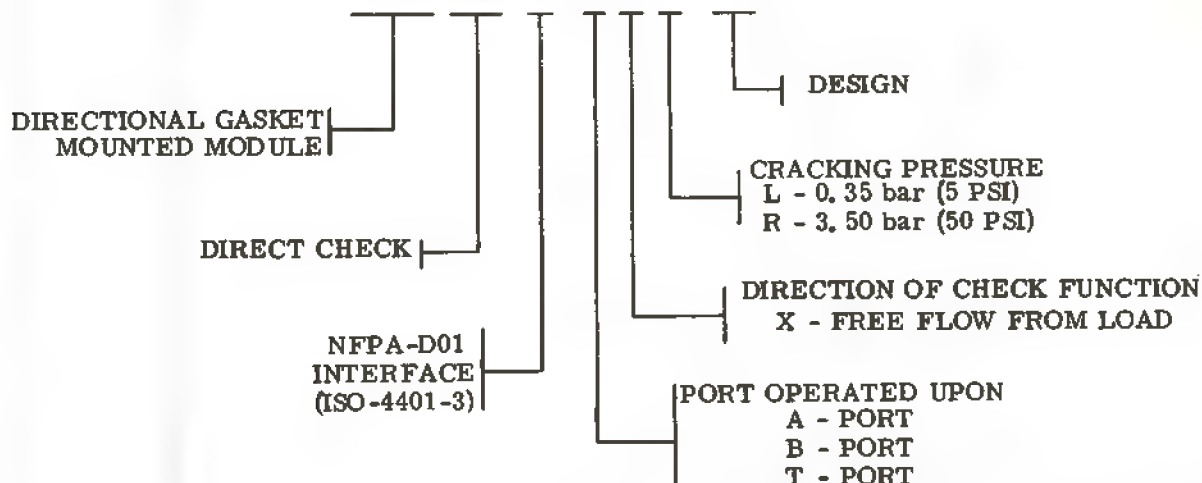
*AVAILALBE ONLY IN KITS OF 25 EACH

NOTE: THIS UNIT IS OF METRIC DESIGN

▲INCLUDED IN F3 SEAL KIT 920107

MODEL CODE BREAKDOWN

DGM DC - 3 - * X * - 20



For satisfactory service life of these components in industrial applications, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from Vickers OFF, OFR, and OFRS series are recommended.

Litho in U. S. A.

Service Parts Information

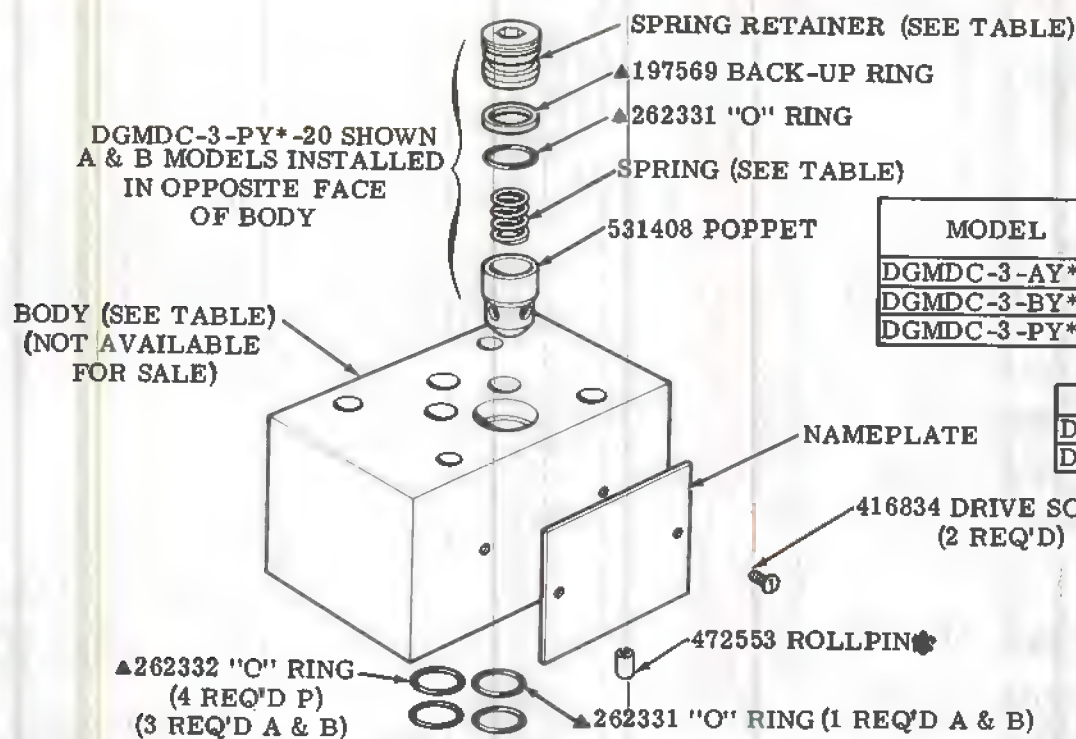
DIRECT CHECK VALVE MODULE

DGMDC-3-*X*-20

DGMDC-3-*Y*-20

VICKERS

A TRIMONA COMPANY



✦ AVAILABLE ONLY IN
KITS OF 25 EACH

MODEL	BODY S/A	SPRING RETAINER
DGMDC-3-AY*-20	531692	531492
DGMDC-3-BY*-20	531693	531492
DGMDC-3-PY*-20	531409	531406

MODEL	SPRING
DGMDC-3-*YL-20	531404
DGMDC-3-*YR-20	531405

NOTE: THIS UNIT IS
OF METRIC DESIGN

✦ INCLUDED IN F3
SEAL KIT 920107

MODEL CODE BREAKDOWN

DGM DC - 3 - * Y * - 20

DIRECTIONAL GASKET
MOUNTED MODULE

DIRECT CHECK

NFPA-D01
INTERFACE
(ISO-4401-3)

DESIGN

CRACKING PRESSURE
L - 0.35 bar (5 PSI)
R - 3.50 bar (50 PSI)

DIRECTION OF CHECK FUNCTION
Y - FREE FLOW TO LOAD

PORT OPERATED UPON
A - A PORT
B - B PORT
P - PRESSURE PORT

For satisfactory service life of these components in industrial applications, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from Vickers OFP, OFR, and OFRS series are recommended.

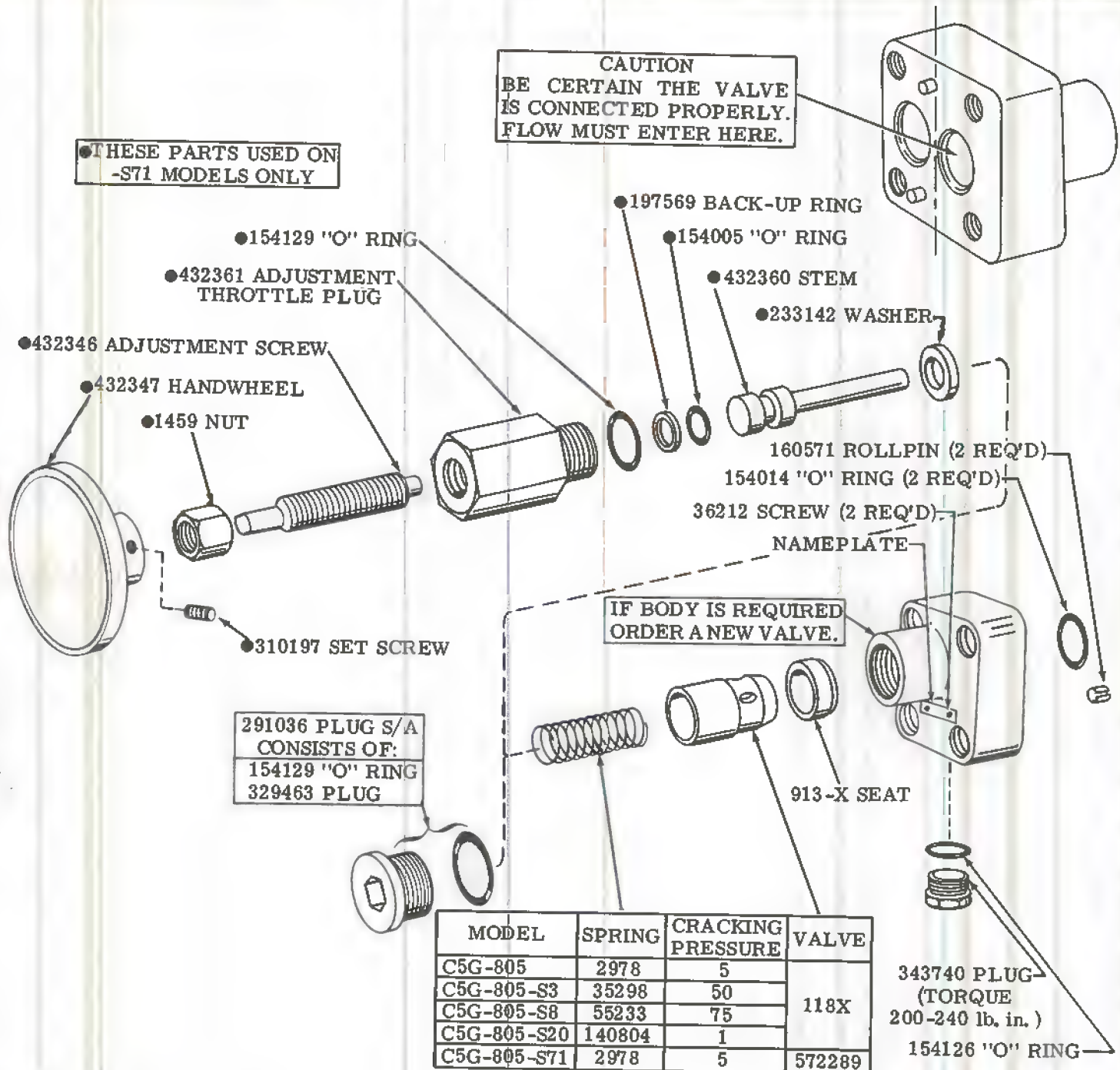


Service Parts Information

C5G-805-(S*)

VICKERS
A TRIMONA COMPANY

3/8 INCH
MANIFOLD MOUNTED
CHECK VALVE



For satisfactory service life of these components in industrial applications, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from Vickers OFP, OFR, and OFRS series are recommended.

Litho in U. S. A.

Vickers, Incorporated
P.O. Box 302
Troy, Michigan 48007-0302

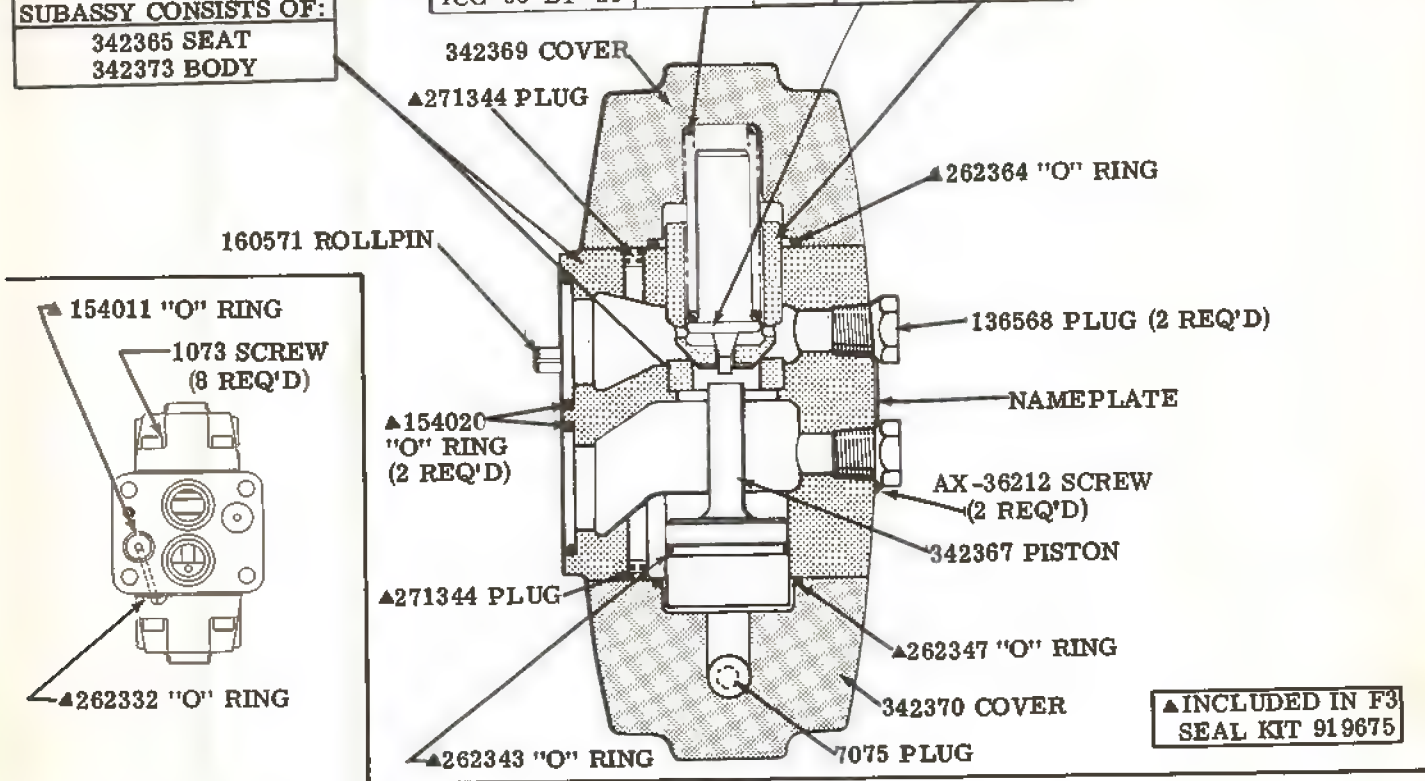
Revised 5-1-85

I-3582-S

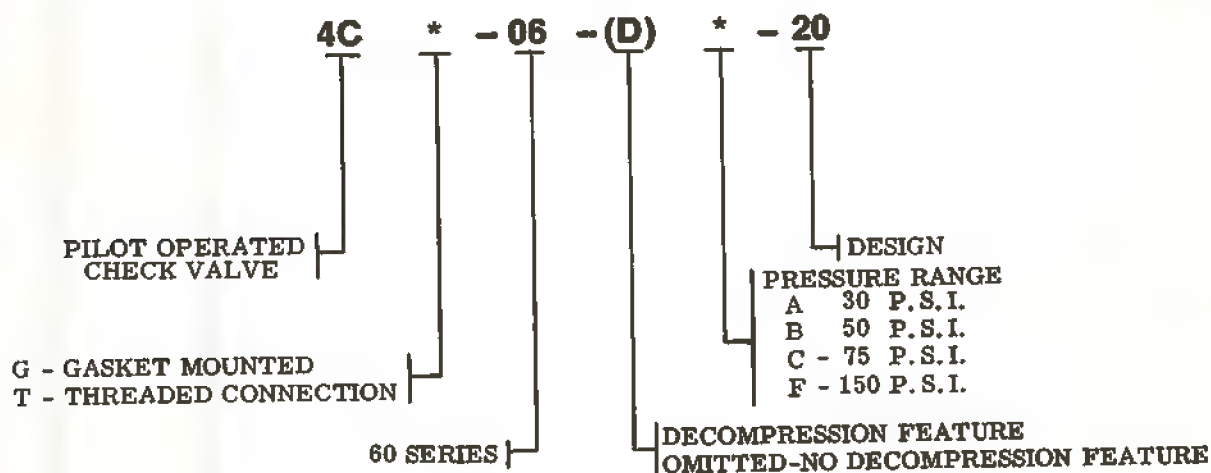
4CG-06-(D)-20

MODEL	SPRING	P. S. I.	GUIDE/ POPPET	CHECK VALVE
4CG-06-A-20	354636	30	359860	359859
4CG-06-DA-20			354644	342366
4CG-06-B-20	386660	50	359860	359859
4CG-06-C-20	388352	75		
4CG-06-DC-20			388353	150
4CG-06-F-20	388353	150	388359	
4CG-06-DF-20				

342374 BODY & SEAT
SUBASSY CONSISTS OF:
342365 SEAT
342373 BODY



MODEL CODE BREAKDOWN



For satisfactory service life of these components, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from Vickers OFP, OFR, and OFRS series are recommended.

Litho in U. S. A.

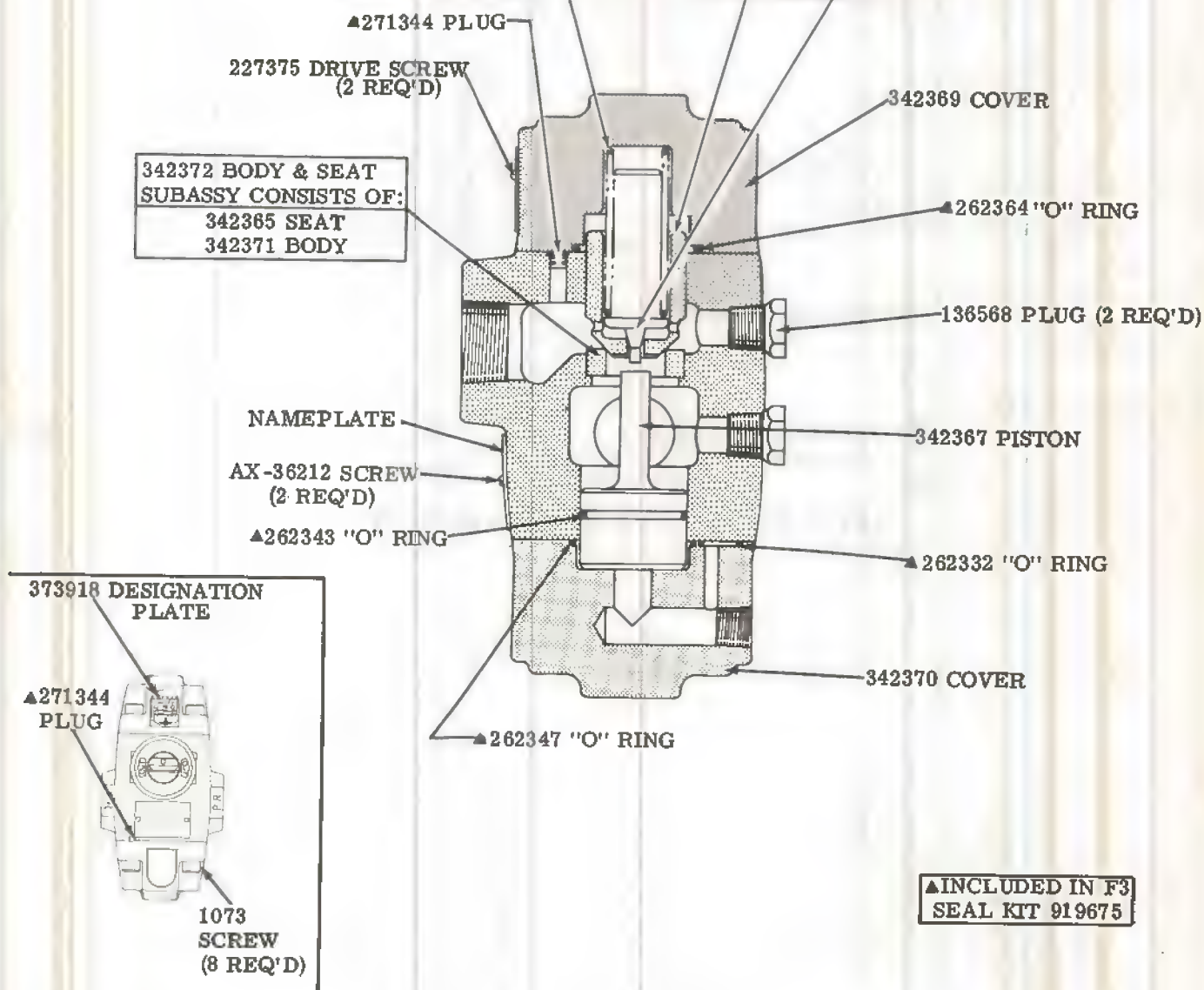
**PILOT OPERATED
CHECK VALVE**

Service Parts Information

4CG-06-(D)*-20

4CT-06-(D)*-20

MODEL	SPRING	P. S. I.	CHECK VALVE	GUIDE/ POPPET
4CT-06-A-20	354636	30	359859	359860
4CT-06-DA-20			342366	354644
4CT-06-B-20	386660	50	359859	359860
4CT-06-C-20	388352	75		
4CT-06-DC-20			342366	354644
4CT-06-F-20	388353	150	359859	388358
4CT-06-DF-20			342366	388359



ORDER AND USE MOUNTING BOLT KIT BK CG825-615 IF A C4G/C5G-825 VALVE IS USED TO REPLACE A C2G-825 OR A C3G-825 VALVE.

WARNING

WHEN A C5G IS USED TO REPLACE A C2G OR C3G, DRILL AN APPROPRIATE HOLE IN THE MOUNTING SURFACE TO ACCOMMODATE THE EXTRA REST PIN OF THE C5G AND PLUG THE UNUSED HOLE. THE PINS PREVENT REVERSAL OF THE VALVE ON THE MOUNTING SURFACE, WHICH COULD CAUSE A SYSTEM MALFUNCTION AND/OR INJURY OF PERSONNEL.

PLUG	"O"RING	MODEL
143137	▲154077	C2G/C3G/C4G
347831	▲161467	C5G

(TORQUE PLUG 40 - 50 lb. ft.)

MODEL	SPRING	CRACKING PRESSURE	VALVE	
C2G-825	2284	5 P. S. I.	108359	
C3G/C4G-825				
C5G-825				
C2G-825-S2	2953	35 P. S. I.		
C3G/C4G-825-S2				
C5G-825-S2				
C2G-825-S3	29059	50 P. S. I.		
C3G/C4G-825-S3				
C5G-825-S3				
C2G-825-S8	39778	75 P. S. I.		
C3G/C4G-825-S8				
C5G-825-S8				
C2G-825-S12	2284	5 P. S. I.	182004	
C3G/C4G-825-S12				
C5G-825-S12				
C2G-825-S17	64062	125 P. S. I.	108359	
C3G/C4G-825-S17				
C5G-825-S17				
C2G-825-S19	106669	20 P. S. I.		
C3G/C4G-825-S19				
C5G-825-S19				
C2G-825-S20	2950	1 P. S. I.		
C3G/C4G-825-S20				
C5G-825-S20				
C5G-825-S44	64062	125 P. S. I.	108359	

MODEL	SEALS		PIN (2 REQ'D)
	INLET	OUTLET	
C2G	42310		102679
C3G	▲154026	▲154077	160571
C4G			
C5G			

C3G/C4G/C5G-825 ▲SEAL KITS		
STANDARD	919381	
F3	919382	

To insure sustained efficiency and maximum trouble free life of this precision equipment, initial and continuous full flow filtration of the fluid medium is essential. Select and apply filters from the Vickers OFP, OFR, and OFRS series, which are available in 3, 10, and 25 micrometre filtration ratings.

Service Parts Information

CHECK VALVES

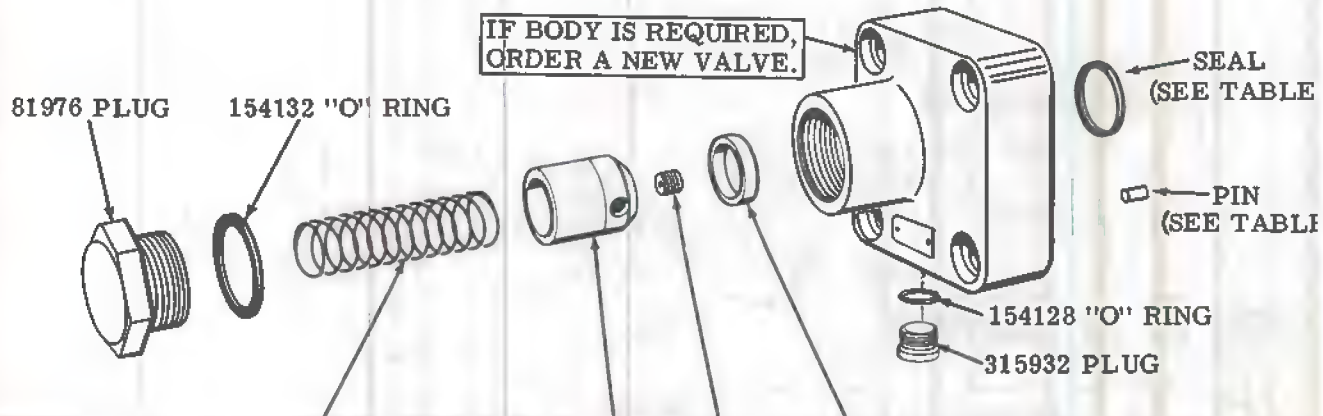
C*G-800 SERIES

VICKERS
A TRIMMOVA COMPANY

*NOTE: THE VALVE SEAT IS INSTALLED THROUGH THE FRONT AS SHOWN ON THE C3G, C4G, & C5G SERIES. ON THE C2G SERIES, THE SEAT IS INSTALLED FROM THE BACK OR MOUNTING SURFACE.

WARNING

WHEN A C5G IS USED TO REPLACE A C2G OR C3G, DRILL AN APPROPRIATE HOLE IN THE MOUNTING SURFACE TO ACCOMMODATE THE EXTRA REST PIN OF THE C5G AND PLUG THE UNUSED HOLE. THE PINS PREVENT REVERSAL OF THE VALVE ON THE MOUNTING SURFACE, WHICH COULD CAUSE A SYSTEM MALFUNCTION AND/OR INJURY OF PERSONNEL.



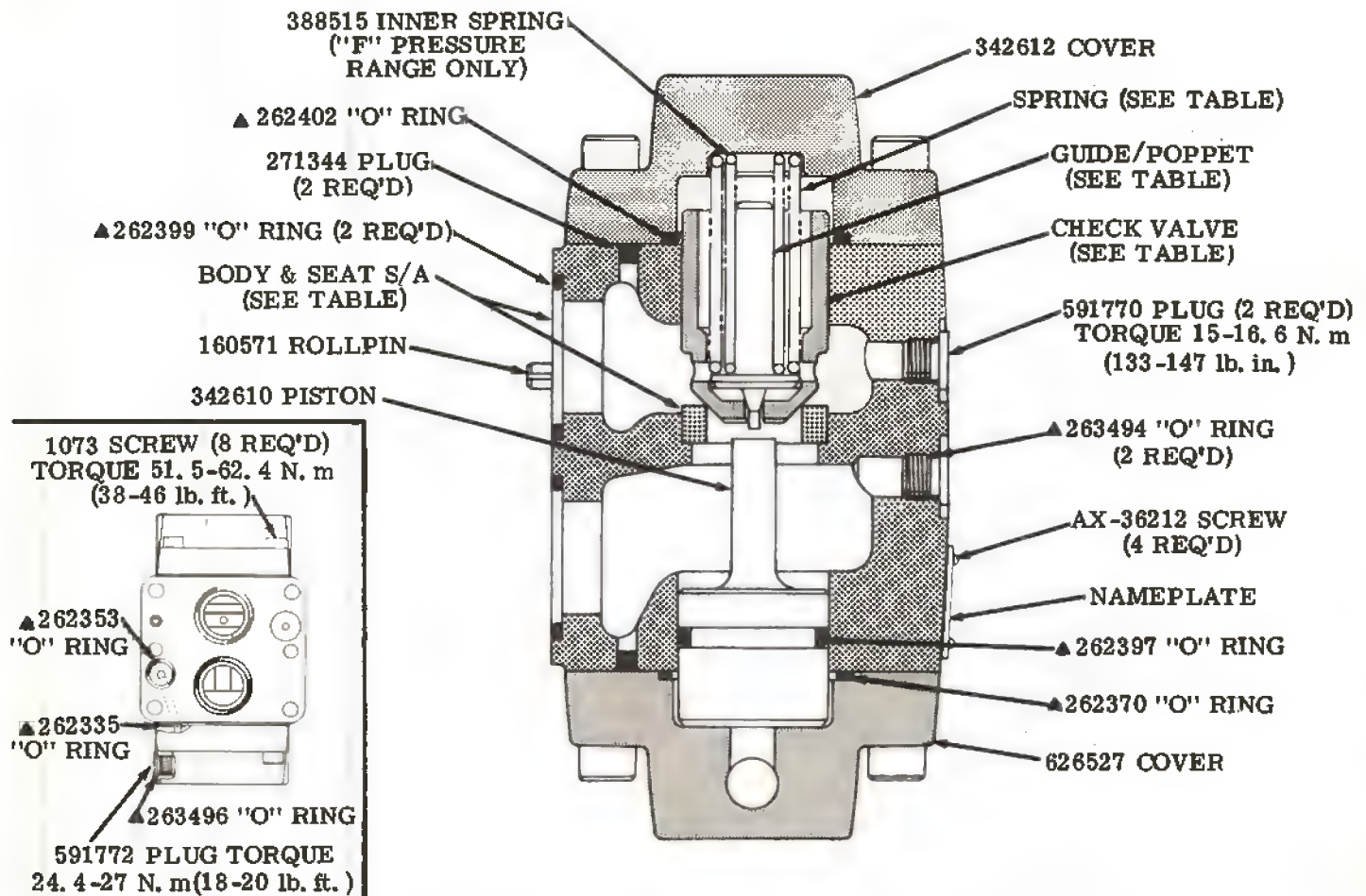
MODEL	SPRING	CRACKING PRESSURE	VALVE	PLUG	*SEAT	SEALS (2 REQ'D)	PIN (2 REQ'D)
C2G-815	2943	5 P. S. I.	81589	—	104403	262395	102679
C3G/C4G-815					263886	154020	160571
C5G-815					104403	262395	102679
C2G-815-S2	36316	35 P. S. I.			263886	154020	160571
C3G/C4G-815-S2					104403	262395	102679
C5G-815-S2					263886	154020	160571
C2G-815-S3	25896	50 P. S. I.			104403	262395	102679
C3G/C4G-815-S3					263886	154020	160571
C5G-815-S3					104403	262395	102679
C2G-815-S8	32999	75 P. S. I.			263886	154020	160571
C3G/C4G-815-S8					104403	262395	102679
C5G-815-S8					263886	154020	160571
C2G-815-S12	2943	5 P. S. I.	108708	81592	104403	262395	102679
C3G/C4G-815-S12					263886	154020	160571
C5G-815-S12					104403	262395	102679
C2G-815-S17	84235	125 P. S. I.			263886	154020	160571
C3G/C4G-815-S17					104403	262395	102679
C5G-815-S17					263886	154020	160571
C2G-815-S19	2287	20 P. S. I.	81589	—	104403	262395	102679
C3G/C4G-815-S19					263886	154020	160571
C5G-815-S19					104403	262395	102679
C2G-815-S20	83902	1 P. S. I.			263886	154020	160571
C3G/C4G-815-S20					104403	262395	102679
C5G-815-S20					263886	154020	160571

4CG-10-(D)*-21

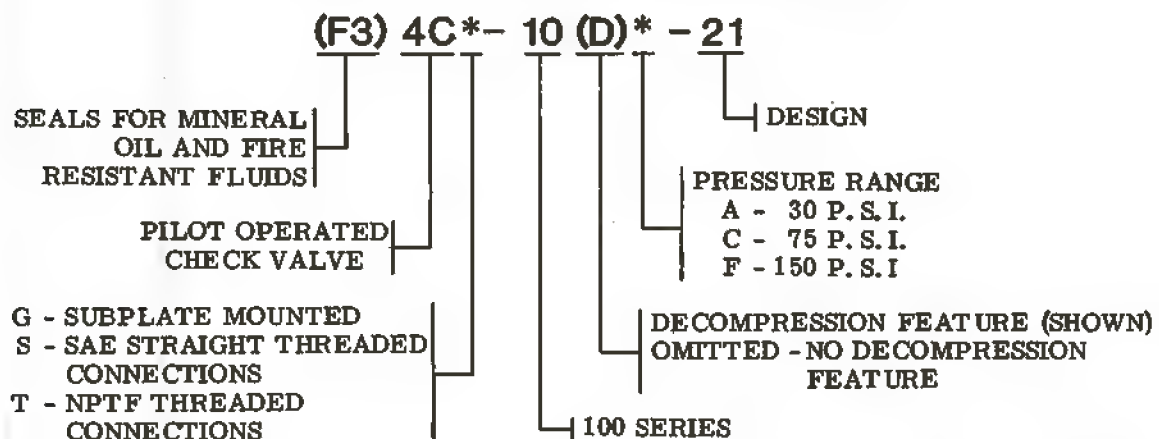
▲SERVICE ALL UNITS
W/F3 SEAL KIT 919679

626530 BODY & SEAT
SUBASSY INCLUDES:
342608 SEAT
626531 BODY

MODEL	SPRING	P.S.I.	GUIDE/ POPPET	CHECK VALVE
4CG-10-A-21	352444	30	359862	359863
4CG-10-DA-21			357424	342609
4CG-10-C-21	388354	75	359862	359863
4CG-10-DC-21			357424	342609
4CG-10-F-21	388355	150	388391	359863
4CG-10-DF-21			388392	342609



MODEL CODE BREAKDOWN



For satisfactory service life of these components, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from Vickers OFF, OFR, and OFRS series are recommended.

Litho in U. S. A.

Service Parts Information

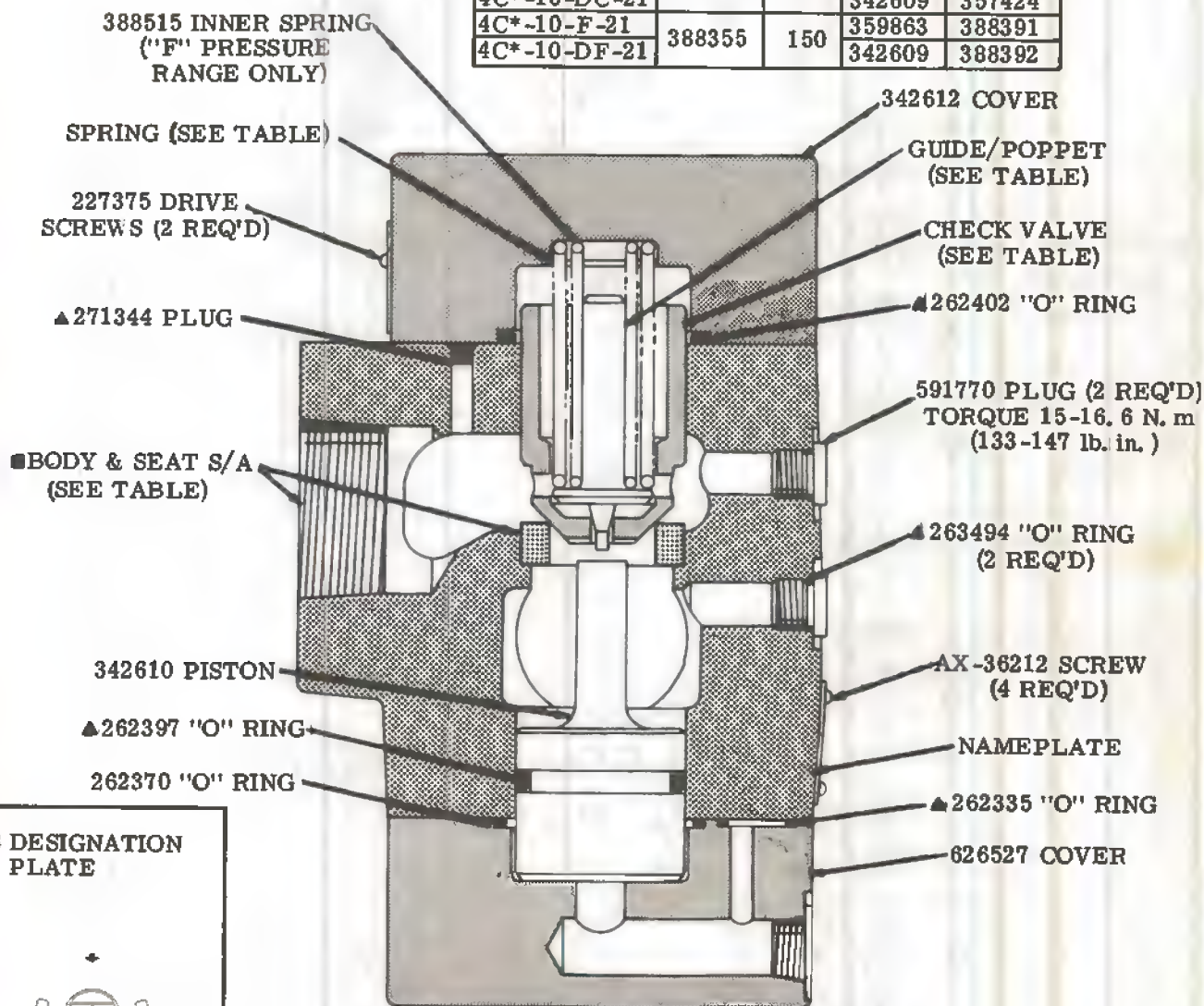
PILOT OPERATED CHECK VALVE

4CT-10-(D)*-21
4CS-10-(D)*-21
4CG-10-(D)*-21

VICKERS

A TRIMBOVA COMPANY

MODEL	SPRING	P.S.I.	CHECK VALVE	GUIDE/POPPET
4C*-10-A-21	352444	30	359863	359862
4C*-10-DA-21			342609	357424
4C*-10-C-21	388354	75	359863	359862
4C*-10-DC-21			342609	357424
4C*-10-F-21	388355	150	359863	388391
4C*-10-DF-21			342609	388392



373918 DESIGNATION
PLATE



▲271344
PL G

1073 SCREW (8 REQ'D)
TORQUE 51.5-62.4 N.m
38-46 lb. ft.

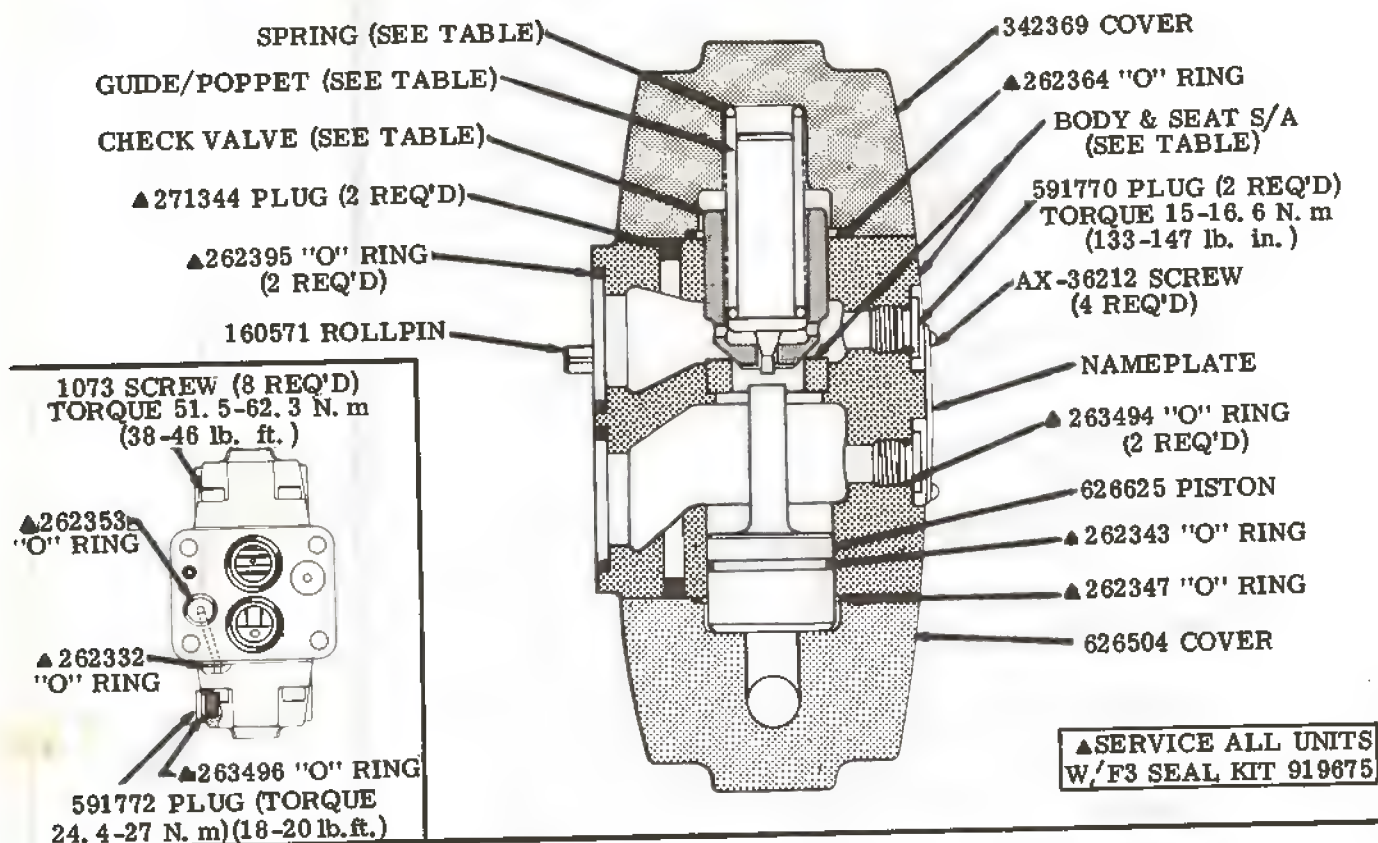
MODEL	■BODY S/A	BODY	SEAT
4CS-10-(D)*-21	626615	626616	342608
4CT-10-(D)*-21	626528	626529	342608

▲SERVICE ALL UNITS
W/F3 SEAL KIT 919677

4CG-06-(D)*-21

626507 BODY & SEAT
SUBASSY INCLUDES:
342365 SEAT
626508 BODY

MODEL	SPRING	P.S.I.	GUIDE/ POPPET	CHECK VALVE
4CG-06-A-21	354636	30	359860	359859
4CG-06-DA-21			354644	342366
4CG-06-B-21	386660	50	359860	359859
4CG-06-DB-21			354644	342366
4CG-06-C-21	388352	75	359860	359859
4CG-06-DC-21			354644	342366
4CG-06-F-21	388353	150	388358	359859
4CG-06-DF-21			388359	342366



MODEL CODE BREAKDOWN

(F3) 4C* - 06 - (D)* - 21

SEALS FOR MINERAL
OIL AND FIRE
RESISTANT FLUIDS

PILOT OPERATED
CHECK VALVE

G - GASKET MOUNTED
S - SAE THREADED
CONNECTIONS
T - NPTF THREADED
CONNECTIONS

60 SERIES

DESIGN

PRESSURE RANGE
A - 30 P.S.I.
B - 50 P.S.I.
C - 75 P.S.I.
F - 150 P.S.I.

DECOMPRESSION FEATURE (SHOWN)
OMITTED - NO DECOMPRESSION
FEATURE

For satisfactory service life of these components, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from Vickers OFP, OFR, and OFRS series are recommended.

Litho in U. S. A.

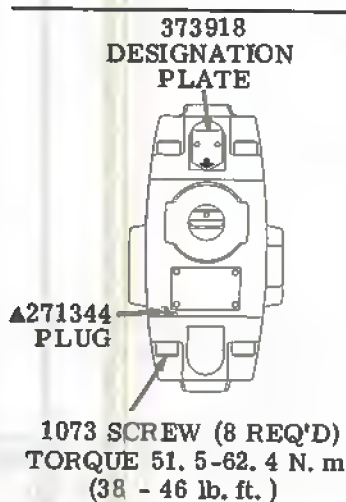
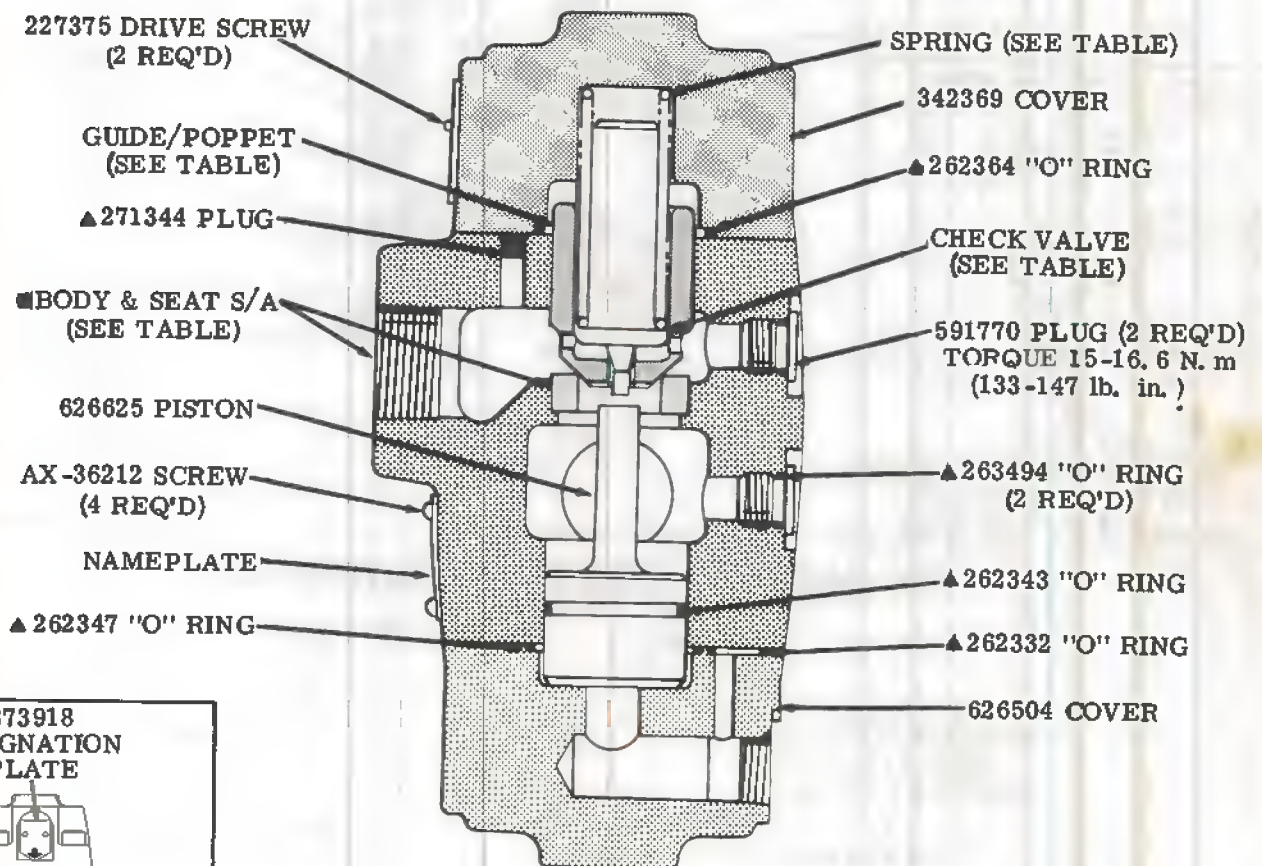
Service Parts Information

VICKERS
A TRIMONA COMPANY

**PILOT OPERATED
CHECK VALVE**

4CT-06-(D)*-21
4CS-06-(D)*-21
4CG-06-(D)*-21

MODEL	SPRING	P.S.I.	CHECK VALVE	GUIDE/POPPET
4C*-06-A-21	354636	30	359859	359860
4C*-06-DA-21			342366	354644
4C*-06-B-21	386660	50	359859	359860
4C*-06-DB-21			342366	354644
4C*-06-C-21	388352	75	359859	359860
4C*-06-DC-21			342366	354644
4C*-06-F-21	388353	150	359859	388358
4C*-06-DF-21			342366	388359



MODEL	■BODY S/A	BODY	SEAT
4CS-06-(D)*-21	626607	626608	342365
4CT-06-(D)*-21	626505	626506	342365

▲SERVICE ALL UNITS
W/F3 SEAL KIT 919675

Vickers, Incorporated
P.O. Box 302
Troy, Michigan 48007-0302

Revised 11-1-85

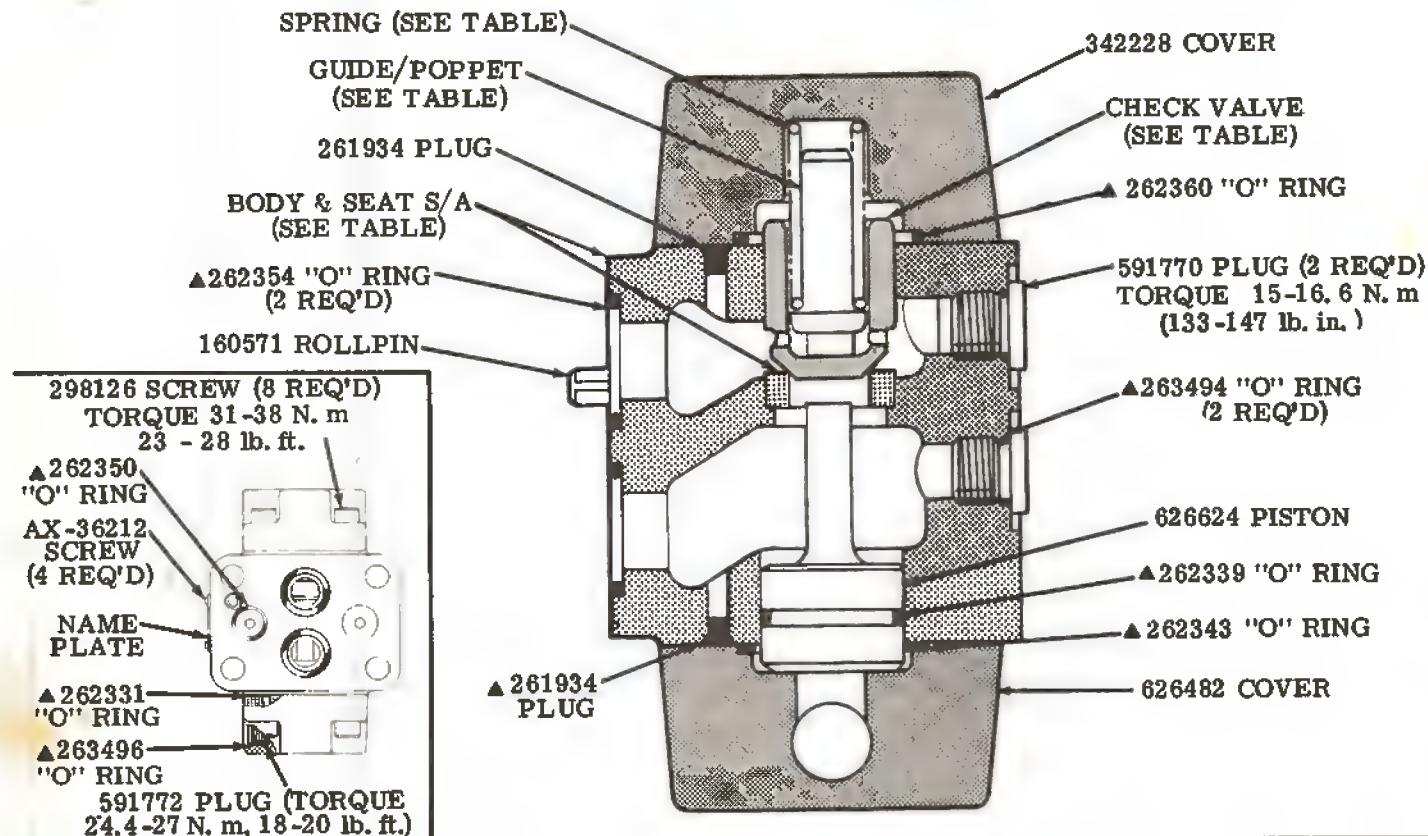
I-3682-S

4CG-03-(D)*-21

▲SERVICE ALL UNITS
W/F3 SEAL KIT 919671

626485 BODY & SEAT
S/A INCLUDES:
342224 SEAT
626486 BODY

MODEL	SPRING	PRESSURE P. S. I.	CHECK VALVE	GUIDE/ POPPET
4CG-03-A-21	352439	30	359861	359858
4CG-03-DA-21			342225	352440
4CG-03-B-21	398302	50	359861	359858
4CG-03-DB-21			342225	352440
4CG-03-C-21	388350	75	359861	359858
4CG-03-DC-21			342225	352440
4CG-03-F-21	388351	150	359861	388357
4CG-03-DF-21			342225	388356



MODEL CODE BREAKDOWN

(F3) - 4C* - 03 - (D)* - 21

SEALS FOR MINERAL
OIL AND FIRE
RESISTANT FLUIDS

PILOT OPERATED
CHECK VALVE

G - SUBPLATE MOUNTED
S - SAE STRAIGHT THD
CONNECTION
T - NPTF THREADED
CONNECTION

30 SERIES

DESIGN

PRESSURE RANGE
A - 30 P. S. I.
B - 50 P. S. I.
C - 75 P. S. I.
D - 150 P. S. I.

DECOMPRESSION FEATURE
OMITTED - NO DECOMPRESSION
FEATURE (SHOWN)

For satisfactory service life of these components, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from Vickers OFF, OFR, and OFRS series are recommended.

Litho in U. S. A.

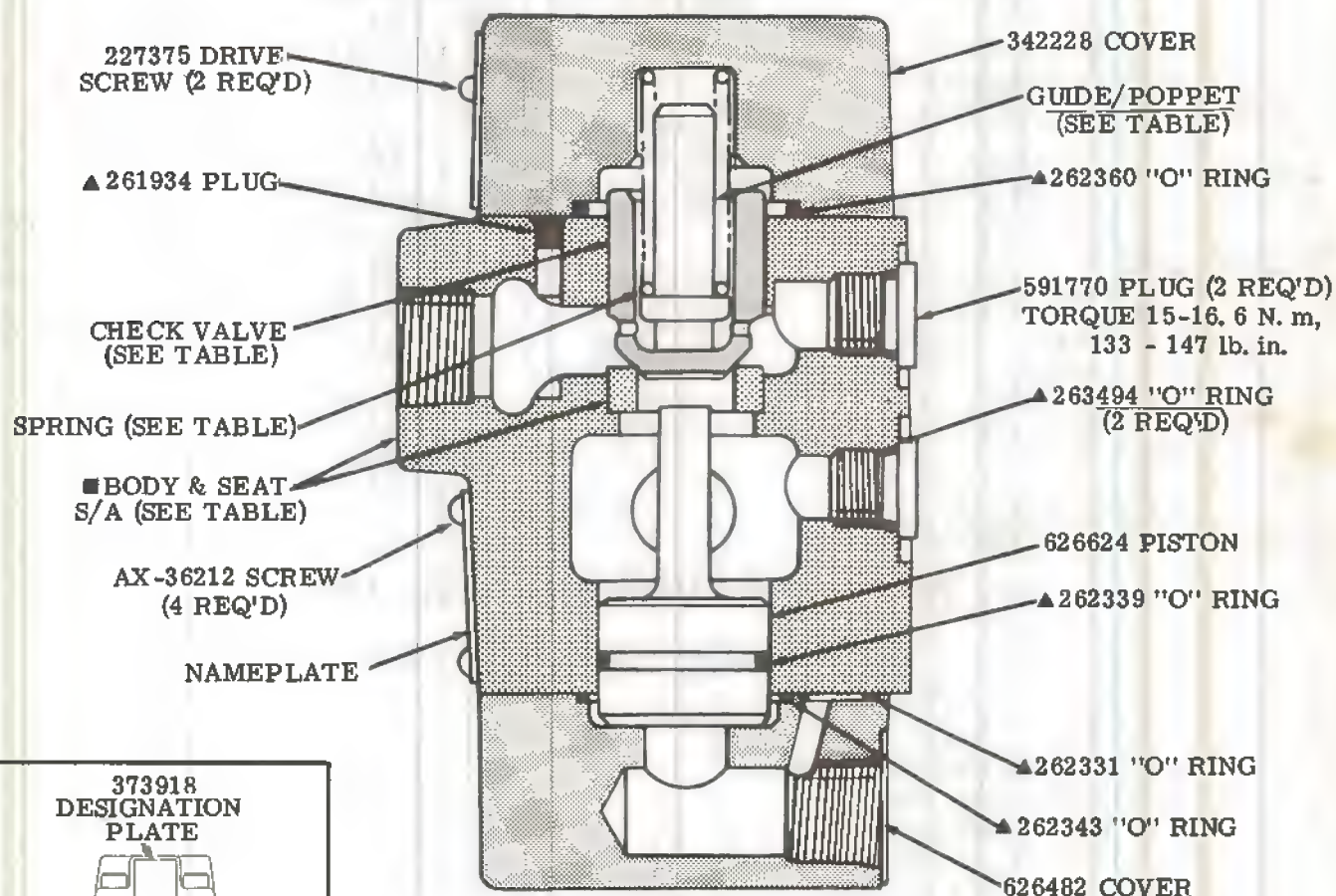
Service Parts Information

PILOT OPERATED CHECK VALVE

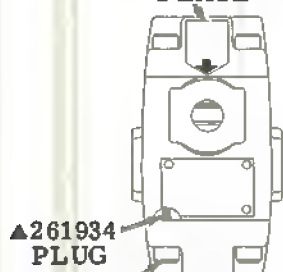
4CT-03-(D)*-21
4CS-03-(D)*-21
4CG-03-(D)*-21

VICKERS
A TRIMONA COMPANY

MODEL	SPRING	PRESSURE P. S. I.	CHECK VALVE	GUIDE/ POPPET
4C*-03-A-21	352439	30	359861	359858
4C*-03-DA-21			342225	352440
4C*-03-B-21			359861	359858
4C*-03-DB-21	398302	50	342225	352440
4C*-03-C-21			359861	359858
4C*-03-DC-21	388350	75	342225	352440
4C*-03-F-21			359861	388357
4C*-03-DF-21	388351	150	342225	388356



373918
DESIGNATION
PLATE



298126 SCREW (8 REQ'D)
TORQUE 31-38 N. m
(23-28 lb. ft.)

MODEL	BODY S/A	BODY	SEAT
4CS-03-(D)*-21	626550	626551	342224
4CT-03-(D)*-21	626483	626484	

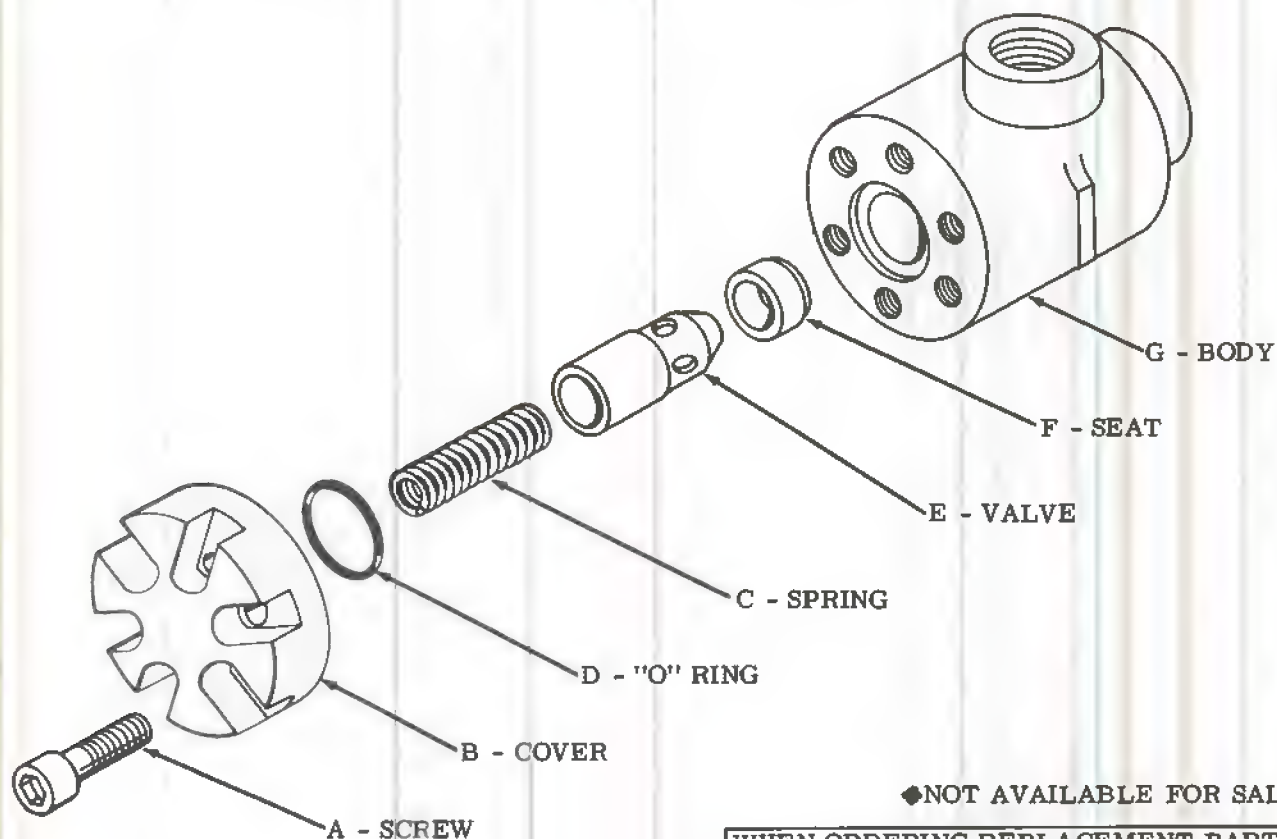
▲SERVICE ALL UNITS
W/F3 SEAL KIT 919668

Service Parts Information

RIGHT ANGLE
CHECK VALVES
C2S-800 SERIES

C2S-805-(S**)
C2S-815-(S**)
C2S-825-(S**)

VICKERS
A TRIMONA COMPANY



◆NOT AVAILABLE FOR SALE

WHEN ORDERING REPLACEMENT PARTS,
FURNISH COMPLETE MODEL NUMBER &
PART NUMBER. DO NOT ORDER BY INDEX
REFERENCE ALONE.

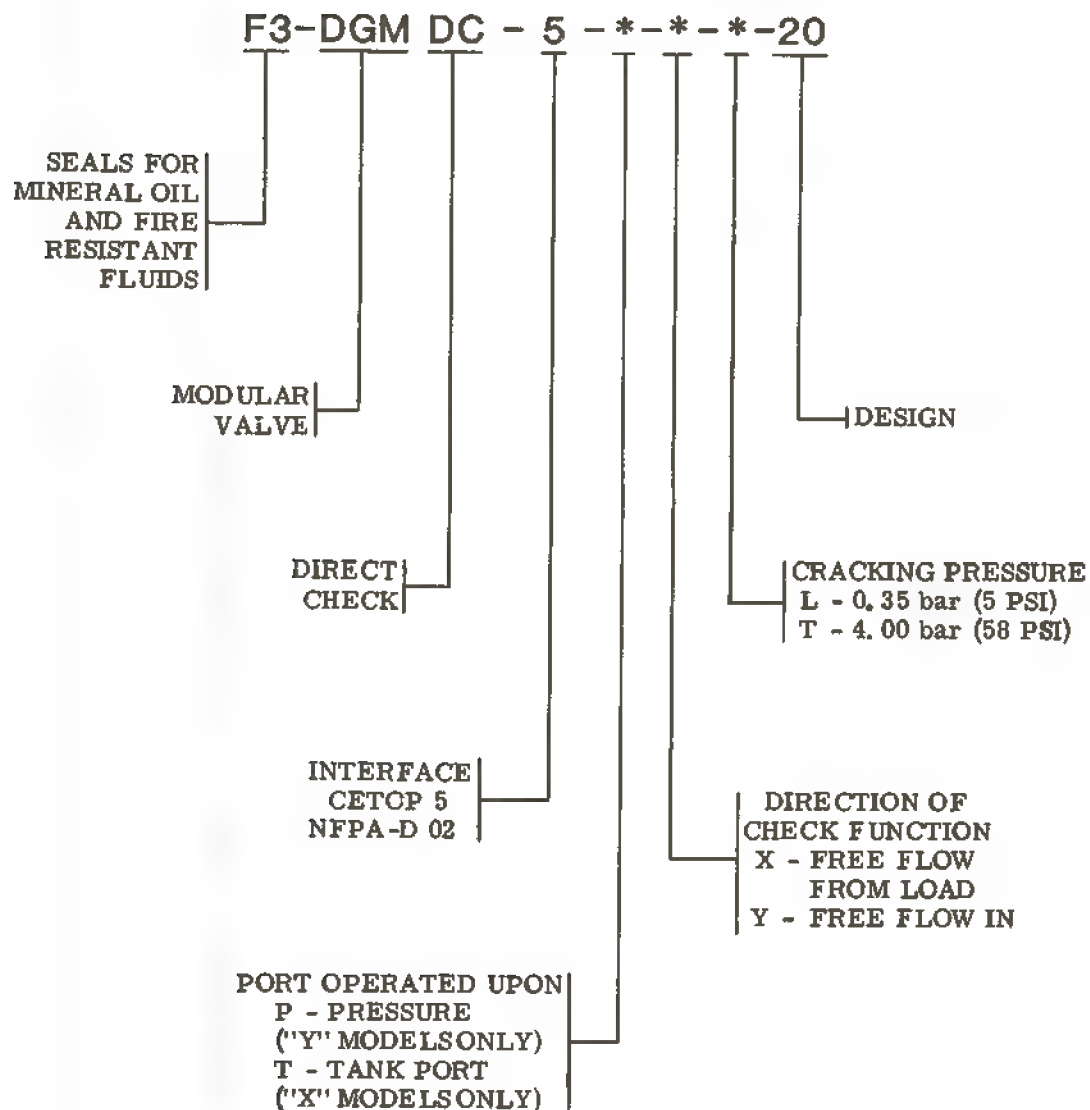
TUBE SIZE O. D.	MODEL	A SCREW (6 REQ'D)	◆B COVER	C SPRING	CRACKING PRESSURE (P. S. I.)	D "O" RING	E VALVE	F SEAT	◆G BODY
1/2"	C2S-805	1050	5657	2978	5	262339	118-X	913-X	591583
	C2S-805-S3			35298	50				
	C2S-805-S8			55233	75				
	C2S-805-S19			65915	20				
3/4"	C2S-815	1071	94099	2943	5	262395	2714	2715	591577
	C2S-815-S3			25896	50				
	C2S-815-S8			32999	75				
	C2S-815-S19			2287	20				
1-1/4"	C2S-825	1073	94097	2284	5	262402	2587	2937	591580
	C2S-825-S3			29059	50				
	C2S-825-S8			39778	75				
	C2S-825-S19			106669	20				

Vickers, Incorporated
P.O. Box 302
Troy, Michigan 48007-0302

Revised 11-1-85

I-3612-S

MODEL CODE BREAKDOWN



For satisfactory service life of these components in industrial applications, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from Vickers OFP, OFR, and OFRS series are recommended.

Litho in U. S. A.

Service Parts Information

VICKERS

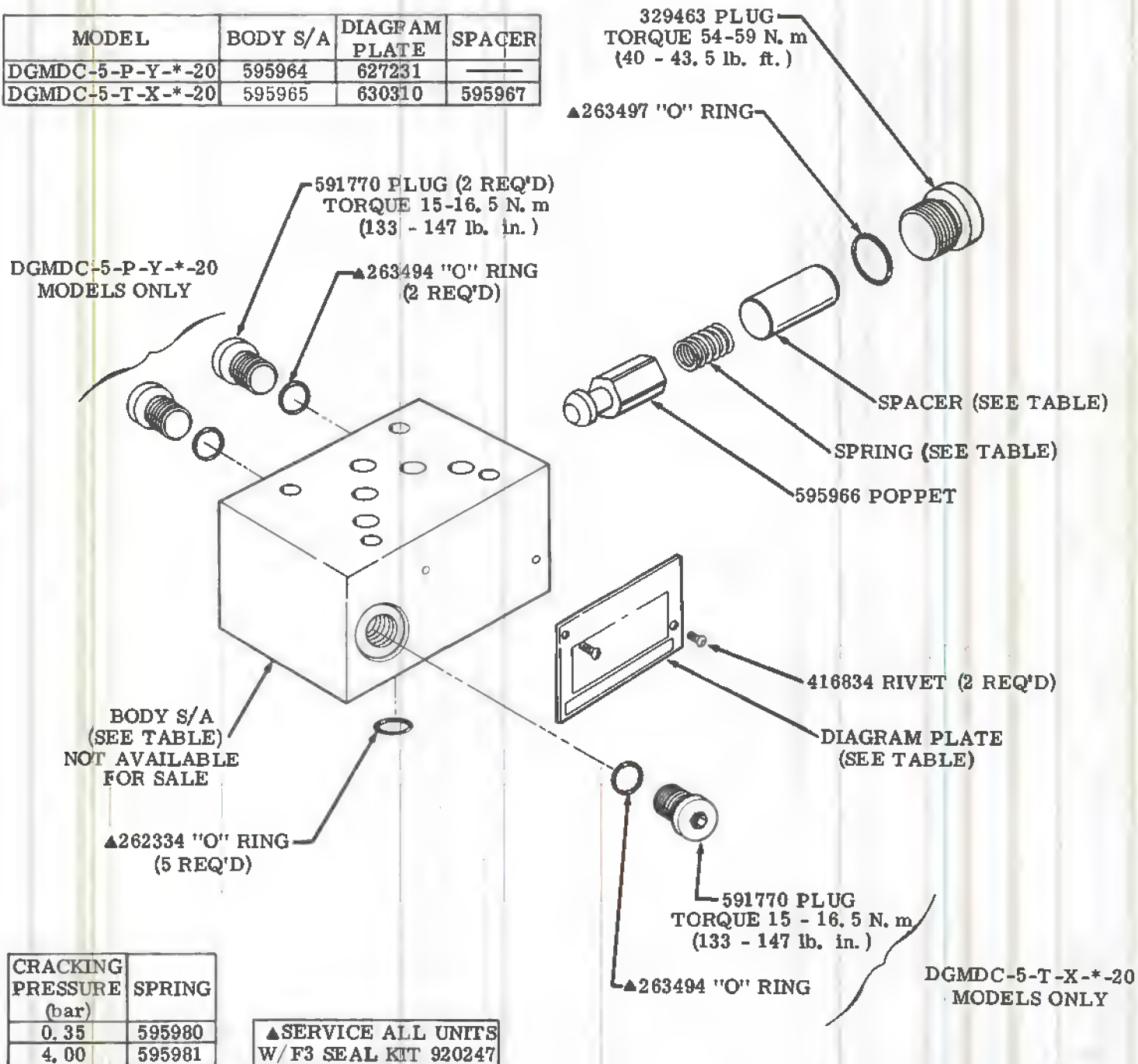
A TRINNOVA COMPANY

DIRECT CHECK VALVE MODULE

DGMDC-5-T-X-*-20

DGMDC-5-P-Y-*-20

MODEL	BODY S/A	DIAGRAM PLATE	SPACER
DGMDC-5-P-Y-*-20	595964	627231	—
DGMDC-5-T-X-*-20	595965	630310	595967

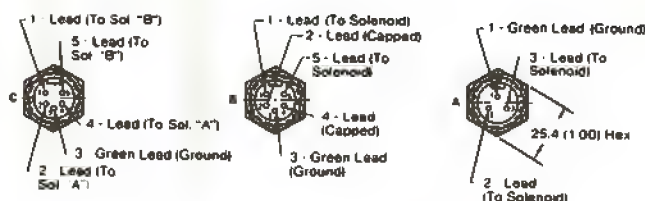


Vickers, Incorporated
P.O. Box 302
Troy, Michigan 48007-0302

Revised 7-1-85

1-3636-S

ELECTRICAL CONNECTOR



A 3 Pole Single Solenoid Models
B 5 Pole Single Solenoid Models
C 5 Pole Double Solenoid Models

CONNECTOR TYPE	PART NUMBER	WARNING TAG
3 PIN	400784	400881
5 PIN	409706	400882

ELECTRICAL POWER MUST BE DISCONNECTED BEFORE REMOVING OR REPLACING ELECTRICAL PLUG

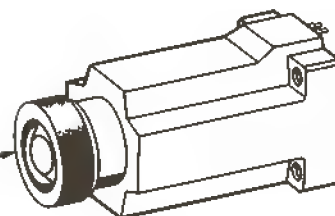
DIN STANDARD RECEPTACLE

DIN RECEPTACLE	PART NUMBER
A SOLENOID (GRAY)	710776
B SOLENOID (BLACK)	710775



MANUAL OVERRIDE

500370
MANUAL
OVERRIDE
END CAP



MODEL CODE BREAKDOWN

KDG-*-8-OL-*(*)-**-11-***-***-*-M**

PROPORTIONAL TYPE
DIRECTIONAL VALVE

SPOOL SPRING ARRANGEMENT

F - 3 POSITION - SPRING
CENTERED
GF - 2 POSITION - SPRING
CENTERED SOLENOID A
JF - 2 POSITION - SPRING
CENTERED SOLENOID B

NOMINAL VALVE SIZE
8 - NFPA-D06
ISO-4401-08

SYSTEM
OPEN
LOOP

SPOOL TYPES

CY - ALL PORTS BLOCKED. ACTUATOR
METERED TO TANK.
CZ - ALL PORTS BLOCKED. PRESSURE
METERED TO ACTUATOR.
FFXZ - P BLOCKED. A & B RESTRICTED
TO TANK. PRESSURE METERED
TO ACTUATOR.

SPOOL SIZE @ 150 PSI Δp 10 bar Δp
10 - 10 GPM, 38 l/min (CY ONLY)
20 - 20 GPM, 76 l/min (CY ONLY)
40 - 40 GPM, 152 l/min (CY ONLY)
60 - 60 GPM, 227 l/min (CY, CZ, FFXZ)

OVERRIDE OPTION
M - MANUAL
OVERRIDE
BLANK-OMITTED

COIL VOLTAGE
G - 12 VDC
H - 24 VDC

ELECTRICAL OPTIONS
WP - WIRING HOUSING WITH
TERMINAL BLOCK
PA3 - 3 PIN TYPE CONNECTOR
PA5 - 5 PIN TYPE CONNECTOR
U - DIN 43650 CONNECTOR

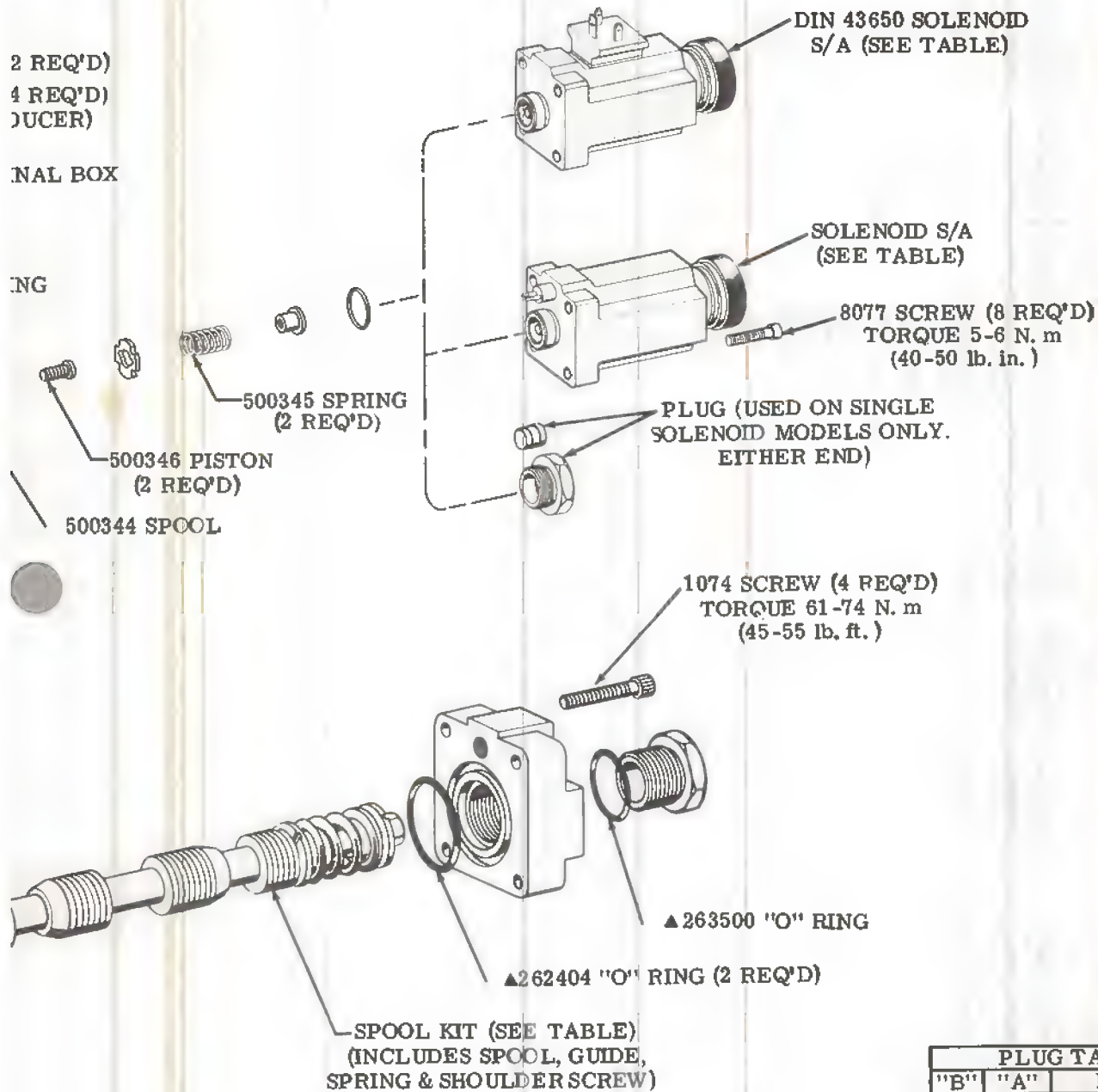
PILOT SOURCE & CONTROL
E-EXTERNAL PILOT
EXTERNAL DRAIN
ET-EXTERNAL PILOT
INTERNAL DRAIN
W-INTERNAL PILOT
EXTERNAL DRAIN
WITH REDUCER
EW-EXTERNAL PILOT
EXTERNAL DRAIN
WITH REDUCER
TW-INTERNAL PILOT
INTERNAL DRAIN
WITH REDUCER
ETW-EXTERNAL PILOT
INTERNAL DRAIN
WITH REDUCER

DESIGN

For satisfactory service life of these components, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from OFP, OFR and OFRS filter series are recommended.

Litho in U.S.A.

DIN 43650 S/A	SOLENOID S/A	VOLTAGE	OVERRIDE OPTION
500338	500336	12 VDC	WITHOUT
500339	500337	24 VDC	OVERRIDE
500342	500340	12 VDC	WITH
500343	500341	24 VDC	OVERRIDE

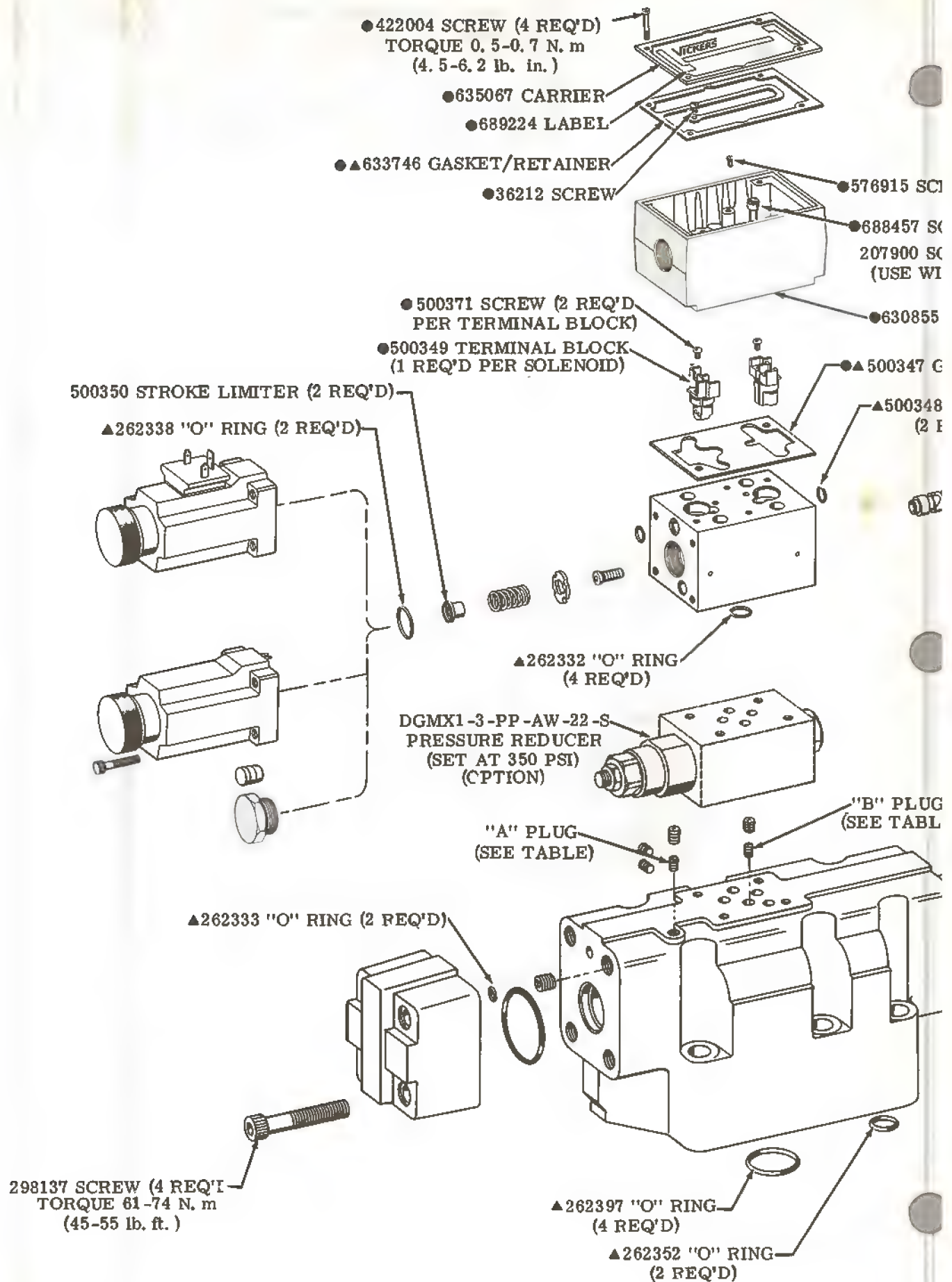


PLUG TABLE		
"B"	"A"	MODEL
—	OMIT	ET, TW, ETW
USE	—	E, ET, EW, ETW

SPOOL KIT	TYPE
926554	CY-10
926555	CY-20
926556	CY-40
926557	CY-60
926558	CZ-60
926559	FFXZ-60

▲INCLUDED IN
920342 SEAL KIT

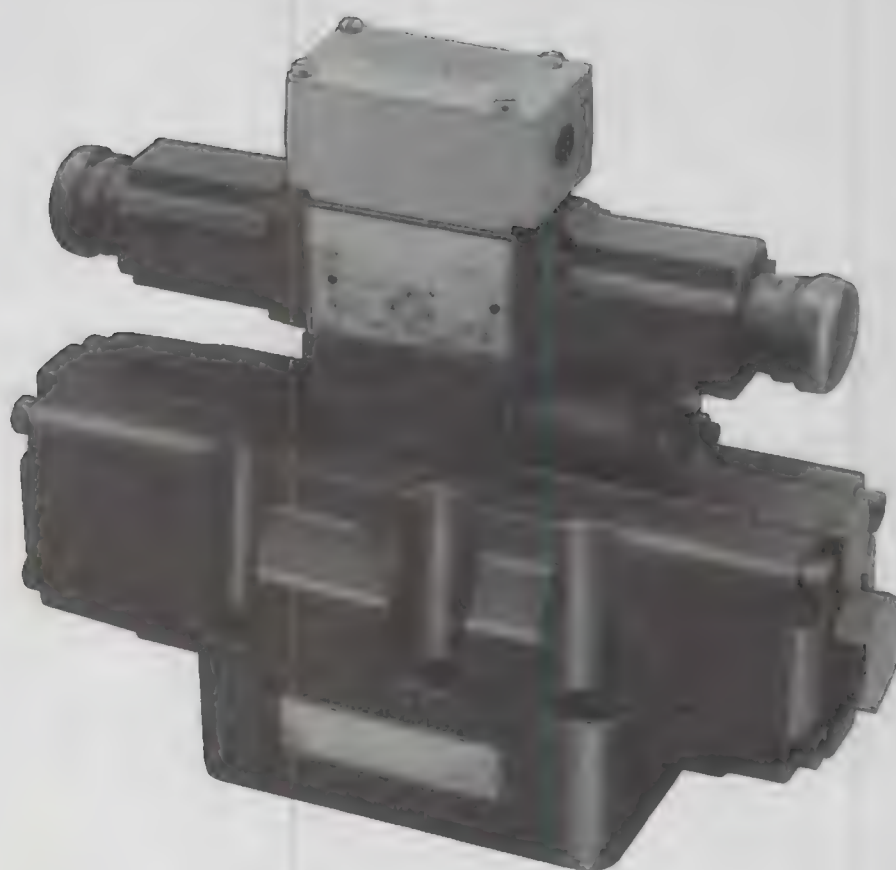
●OMIT WHEN USING
DIN 43650 COILS



Service Parts Information

Proportional Type
Directional Valve

KDG(*)F-8-0L-(**)**-**-11-(**)*-(**)*--(M)

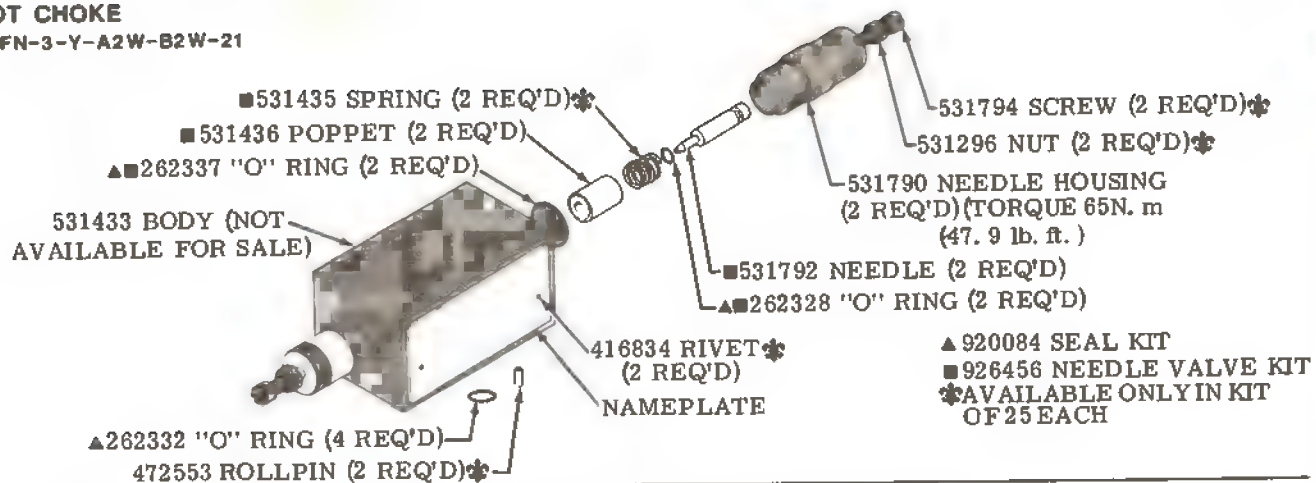


Vickers, Incorporated

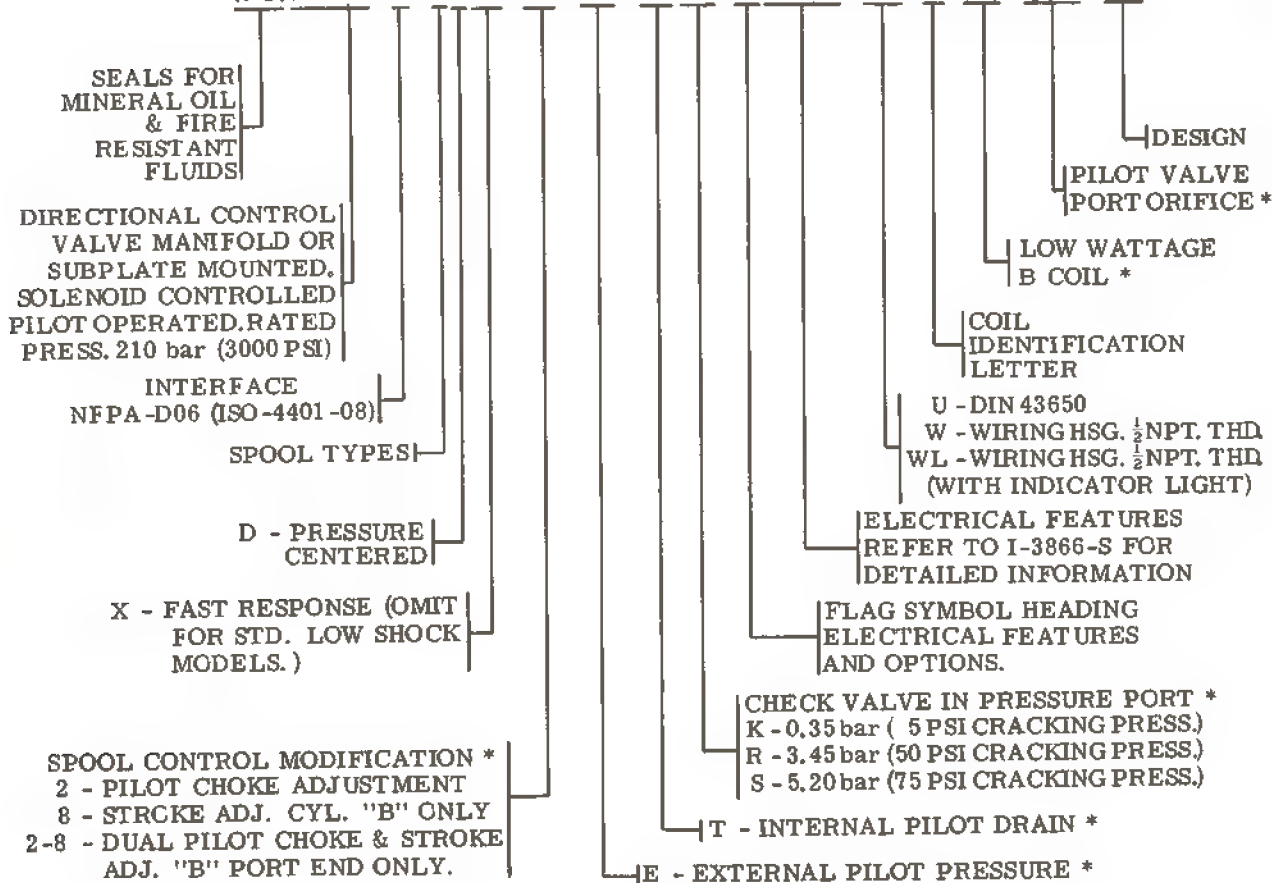
P.O. Box 302
Troy, Michigan 48007-0302

Revised 12-1-87 I-3899-S

DGMFN-3-Y-A2W-B2W-21



(F3)DG5S-8-*D(X)-(*)-(E)-(T)(*)-M(P**)---*(9)-(**) -20

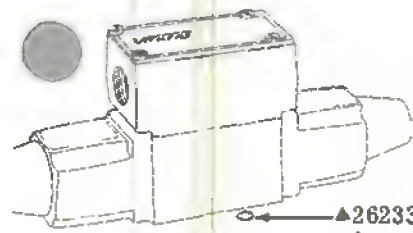


* OMIT WHEN NOT REQ'D

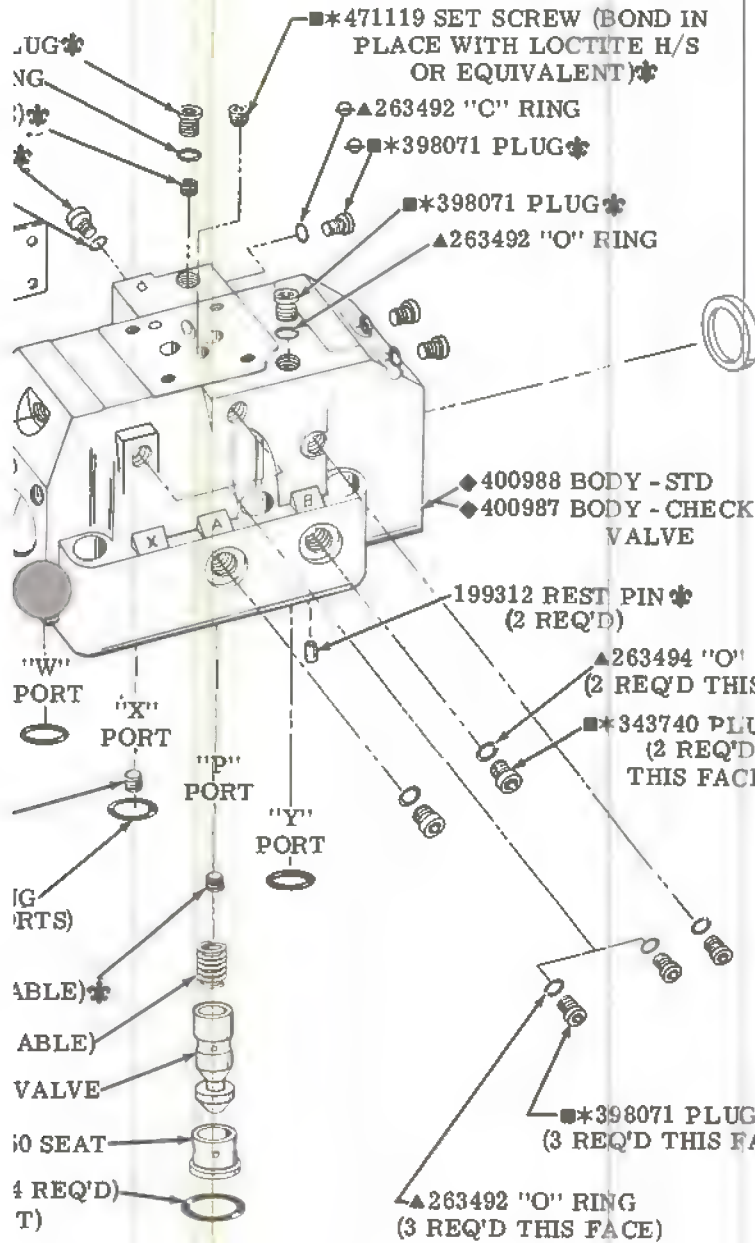
For satisfactory service life of these components, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from Vickers OFF, OFR, and OFRS series are recommended.

Litho in U. S. A.

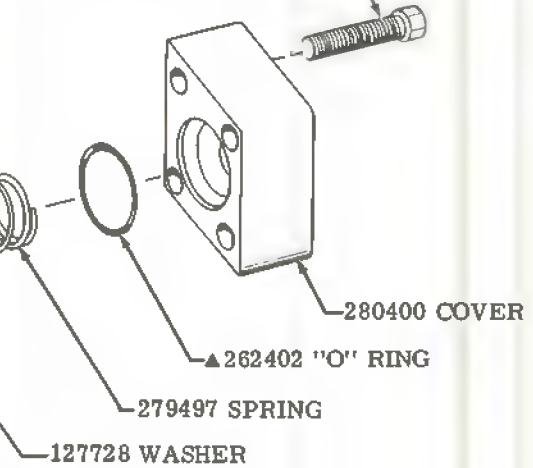
■ PLUG INSTALLATION TABLE			
MODEL	"A" PLUG	"B" PLUG	"C" PLUG
DG5S-8-*D-*-M-*-20	DOES NOT EXIST	237588	—
DG5S-8-*D-*-E-M-*-20		113000	237588
DG5S-8-*D-*-X-M-*-20		—	—
DG5S-8-*D-*-E-X-M-*-20		113000	—
DG5S-8-*D-*-KRS-M-*-20	237588	DOES NOT EXIST	—
DG5S-8-*D-*-E-KRS-M-*-20	113000		237588
DG5S-8-*D-*-X-KRS-M-*-20	—		—
DG5S-8-*D-*-E-X-KRS-M-*-20	113000		—
113000 PLUG (SOLID)✱		237588 PLUG (ORIFICE)✱	



▲262332 "O" RING
(REF.) (4 REQ'D)



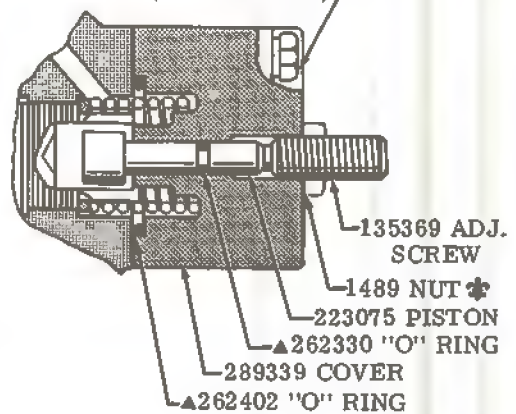
◇473784 SCREW (4 REQ'D)
TORQUE 49 - 59 N. m
(36-44 lb. ft.)



- PARTS PREFIXED WITH SYMBOL
AVAILABLE ONLY IN KITS
- ALL THREADED FASTENERS ARE
METRIC

PARTS SHOWN INCLUDED IN STROKE
ADJ. KIT 941154. STROKE ADJ. CYL.
"B" END ONLY.

470843 SCREW (4 REQ'D)
TORQUE 49-59 N. m
(36 - 44 lb. ft.)



MAIN STAGE VALVE		
MODEL	SPCOL	ID PLATE
DG5S-8-0D	363495	400967
DG5S-8-1D	*276623	400968
DG5S-8-2D	363496	400969
DG5S-8-3D	*276625	400970
DG5S-8-4D	276626	400971
DG5S-8-6D	363498	400972
DG5S-8-8D	363499	400971
DG5S-8-9D	363500	400967
DG5S-8-11D	*276623	573685
DG5S-8-31D	*276625	573685
DG5S-8-33D	363501	400972

PILOT STAGE ATTACHING BOLTS BOLT KIT INCLUDES 4 BOLTS	
MODEL	BOLT KIT
W/OUT PILOT CHOKE	255699
WITH PILOT CHOKE	466838
TORQUE 4.5 - 5.7 N. m (39.8 - 50.4 lb. in.)	
SEE BACK PAGE FOR PILOT CHOKE PARTS BREAKDOWN	

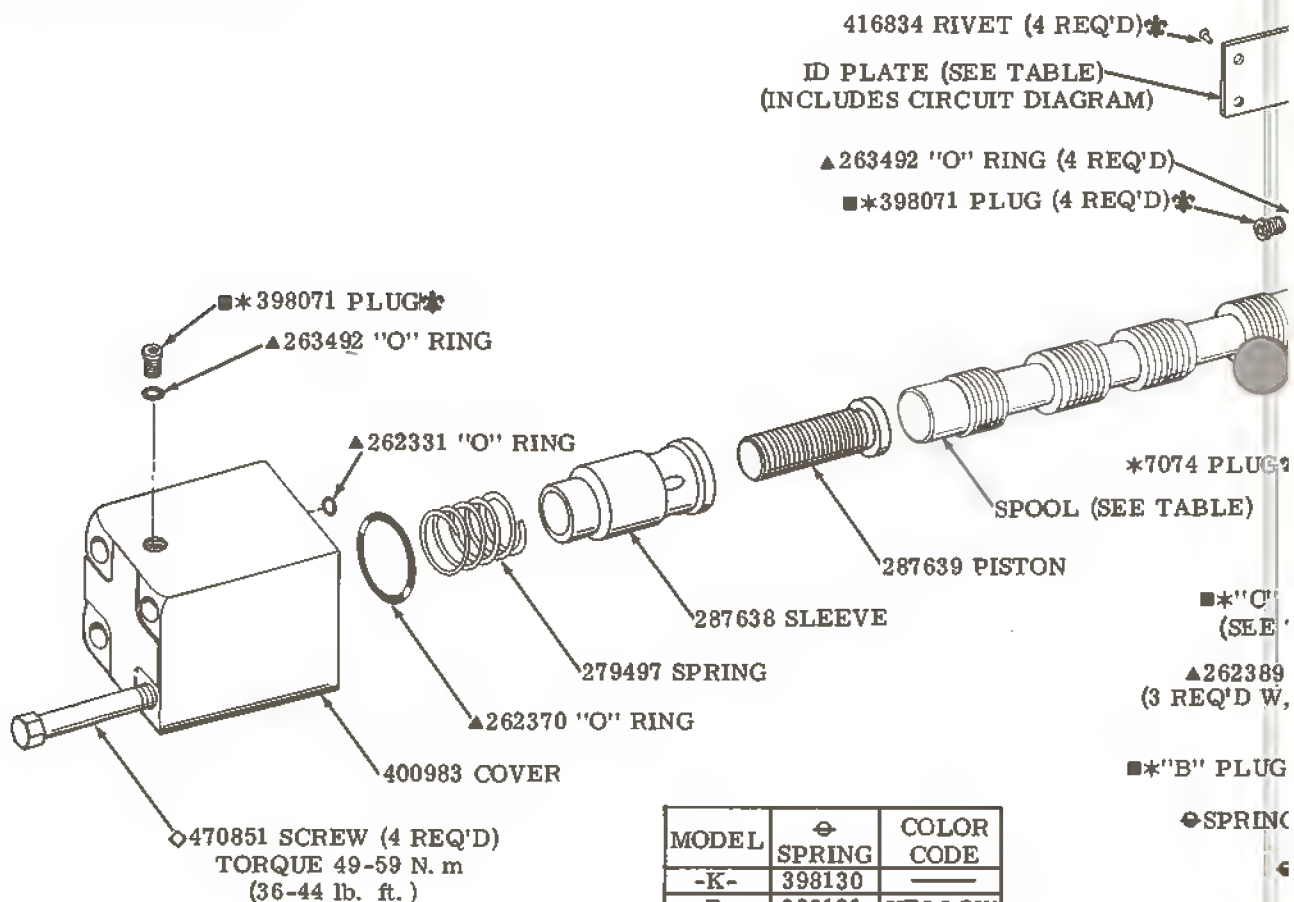
PLUG	TORQUES (OILED)	
	N. m	lb. in.
113000	5.0 - 5.9	45-52
237588		
343740	15.0-16.0	133-142
398071	9.8-10.2	87-90
407533	12.1-12.4	107-110

PILOT VALVE
(SEE TABLE BELOW)

***NOTE**
ASSEMBLE TYPE 1 & 3 SPOOL WITH NARROW CENTER LAND TOWARD "A" END OF VALVE.
ASSEMBLE TYPE 11&31 SPOOL WITH NARROW CENTER LAND TOWARD "B" END OF VALVE.

▲INCLUDED IN F3 SEAL KIT 920336
*INCLUDED IN PLUG KIT 941167
◇INCLUDED IN FASTENER KIT 941171
◆NOT AVAILABLE FOR SALE
⊕USED ON CHECK VALVE MODELS ONLY
■ PLUG TORQUES (SEE TABLE)
✱AVAILABLE ONLY IN KIT CF 25 EACH

⊕■✱41
⊕▲263493
⊕✱"A" PLUG (SEE
⊕✱398071
⊕▲263492 "O"



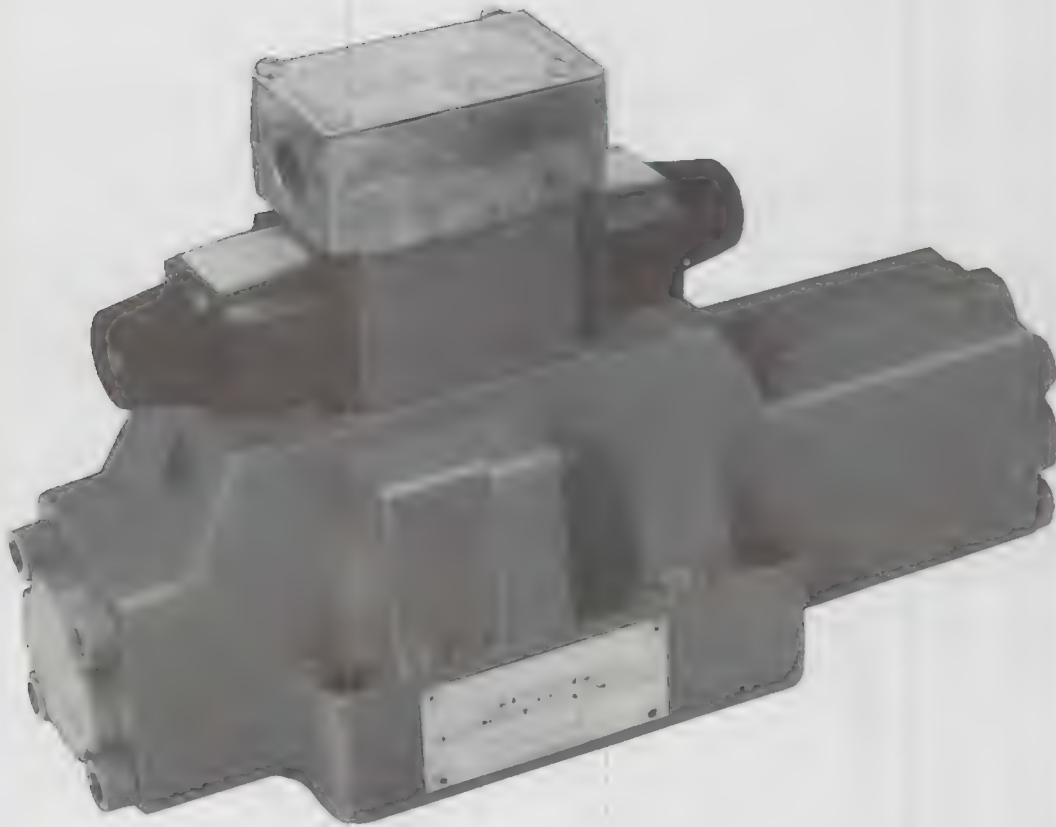
VALVE MODEL CODE	MAIN STAGE SPOOL TYPE	PILOT VALVE MODEL CODE	SERVICE DWG.
DG5S-8-*D-M-*--20	0, 1, 2, 3, 6, 9, 11, 31, 33, 4 & 8	DG4V-3-7C-M-*--40 DG4V-3-78C-M-*--40	I-3863-S



Service Parts Information

**Solenoid Controlled
Pilot Operated
Directional Valves**

DG5S-8-*D-(*)-(*)-M--*-20**



Vickers, Incorporated

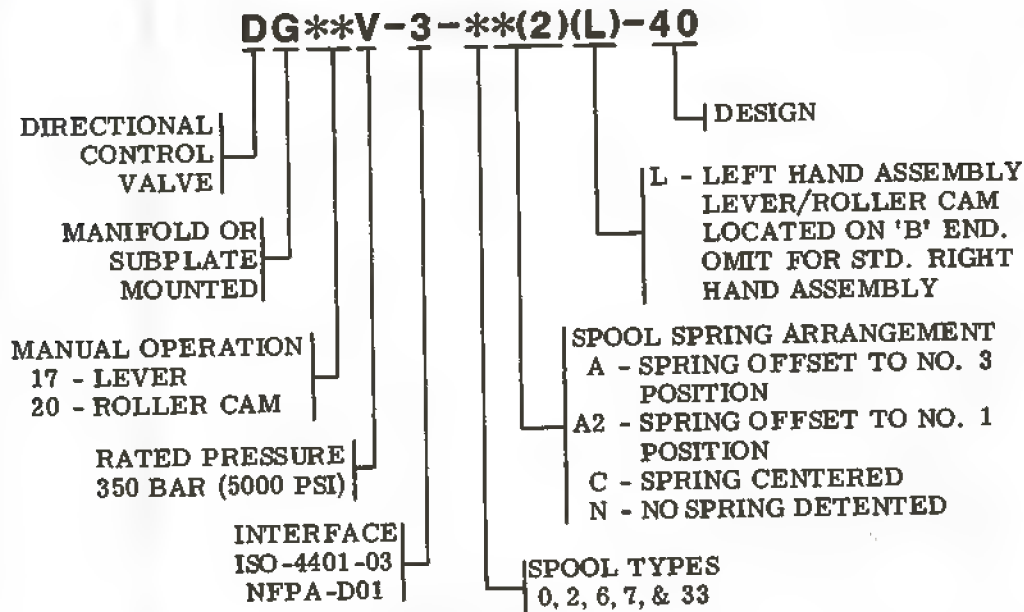
1401 Crooks Road
Troy, Michigan 48064

Released 12-1-86

I-3873-S

130

MODEL CODE BREAKDOWN

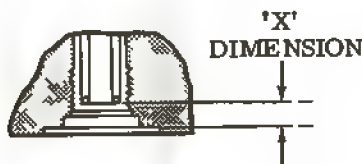


SHIMMING PROCEDURE

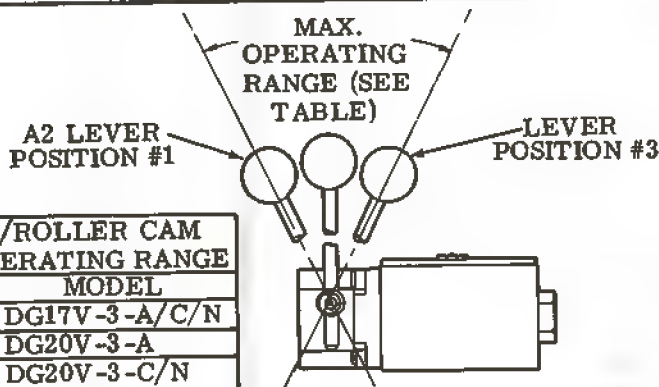
If replacement of the spool, detent, or spring is required, perform the following procedure to maintain a nominal detent force of 5kg, (11 lbs), on detented 'N' models only.

1. Turn valve over so porting is up.
2. Install detent and spring into valve cover. Make sure detent is located in a groove of the spool.

3. Measure 'X' distance between top of spring and spot face.
4. Use this measurement to determine shims from table.
5. Install shims and thread plug in place with a torque of 7.4-9.0 N.m (65.0-79.6 lb.in.)



'X' DIMENSION		SHIMS
mm	in.	REQ'D
1.39	.054	0
1.40 - 1.70	.055 - .067	1
1.71 - 2.00	.068 - .080	2
2.01 - 2.30	.081 - .093	3
2.31 - 2.60	.094 - .106	4



* AVAILABLE IN LOT KITS (25 PCS.)	
PART #	KIT #
468641	944012
468813	944016
468816	944021
472522	944022
472553	944008
989731	944030
989733	944017
989734	944020
989735	944018
989736	944023

For satisfactory service life of these components in industrial applications, use full flow filtration to provide which meets ISO cleanliness code 18/15 or cleaner. Selections from Vickers OFF, OFR, series are recommended.

Litho in U. S. A.

Service Parts Information

VICKERS

A TRIMCOVA COMPANY

LEVER/CAM OPERATED MINIATURE 4-WAY DIRECTIONAL VALVE

DG17V-3-*(2)(L)-40

DG20V-3-*(2)(L)-40

*** NOTE**

COLLAR LOCATION SHOWN FOR "A" MODELS AT LEVER POSITION #3. IF LEVER POSITION #1 IS DESIRED, LOCATE COLLAR BEHIND SPRING TO OBTAIN "A2". SEE MODEL CODE.

→ ASSEMBLE PILOT SHAFTS FROM THE SIDE OF COVER AS SHOWN.

NOTE: ASSEMBLE CENTER LINE OF ROLLER LEVER S/A PARALLEL TO PIVOT SHAFT SLOT.

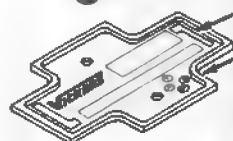
PARTS PREFIXED WITH ▲ AND ■ SOLD IN KIT FORM ONLY.

◆ NOT AVAILABLE FOR SALE.

AS THIS COMPLETE UNIT CAN BE REPLACED AT A NOMINAL COST, FACTORY REPAIR IS NOT PRACTICAL. KITS ARE AVAILABLE TO SUPPORT CUSTOMER REPAIR.

RIGHT HAND ASSEMBLY SHOWN. FOR LEFT HAND, ALL PARTS, EXCEPT BODY, ARE REVERSED. CHANGE THE NAMEPLATE LABEL TO REFLECT NEW MODEL CODE.

- 468641 SCREW (2 REQ'D) ✱
TORQUE 0.5-0.7 N.M (4-6 lb.in.)
- 989583 WASHER (2 REQ'D)
- LABEL (REFER TO J-685777)
- 989585 LABEL CARRIER



- 427692 ROLLER LEVER S/A
(45° maximum operating range. Torque roller lever screw 3.1 - 3.7 N.m (27.4-32.7 lb.in.)

DIRECTION OF
PIVOT SHAFT SLOT

989732 PIVOT
SHAFT

472522 ROLLPIN ✱

468813 ✱
SPOOL
LEVER

989733 PIN ✱

■ 473730 SCREW
(2 REQ'D) (LONG)

■ 473724 SCREW
(2 REQ'D) (SHORT)

▲ 577524 DETENT

▲ 577933 SPRING

▲ 584294 SHIM (REFER TO
BACK PAGE FOR SHIM-
MING PROCEDURES.

▲ 263493 "O" RING

▲ 588439 PLUG (TORQUE
7.4 - 9.0 N.m
65.0 - 79.6 lb. in.)

DETENT FEATURE
("N" MODELS ONLY)

* 989735 COLLAR (1 REQ'D) ✱
(USE ON "A" MODELS ONLY)

989736 SPRING (OMIT ON
"N" MODELS)

SPOOL
(SEE TABLE)

▲ 262336 "O" RING

676268 END CAP (TORQUE
17.0-28.0 N.m 150-250 lb.in.)

989737 BCDY (NOT
AVAILABLE FOR SALE)

▲ 262332 "O" RING (4 REQ'D)

472553 ROLLPIN ✱

989734 WASHER (2 REQ'D) ✱
(USE ON "C" MODELS ONLY)

989736 SPRING (CMIT ✱
ON "N" MODELS)

468816 KNOB ✱

472522 ROLLPIN ✱

989731 LEVER ✱

468813 SPOOL LEVER ✱

468812 PIVOT SHAFT

▲ 262333 "O" RING (2 REQ'D)

▲ 262341 "O" RING

◆ 989727 COVER ("A" & "C")

◆ 989728 COVER ("N")

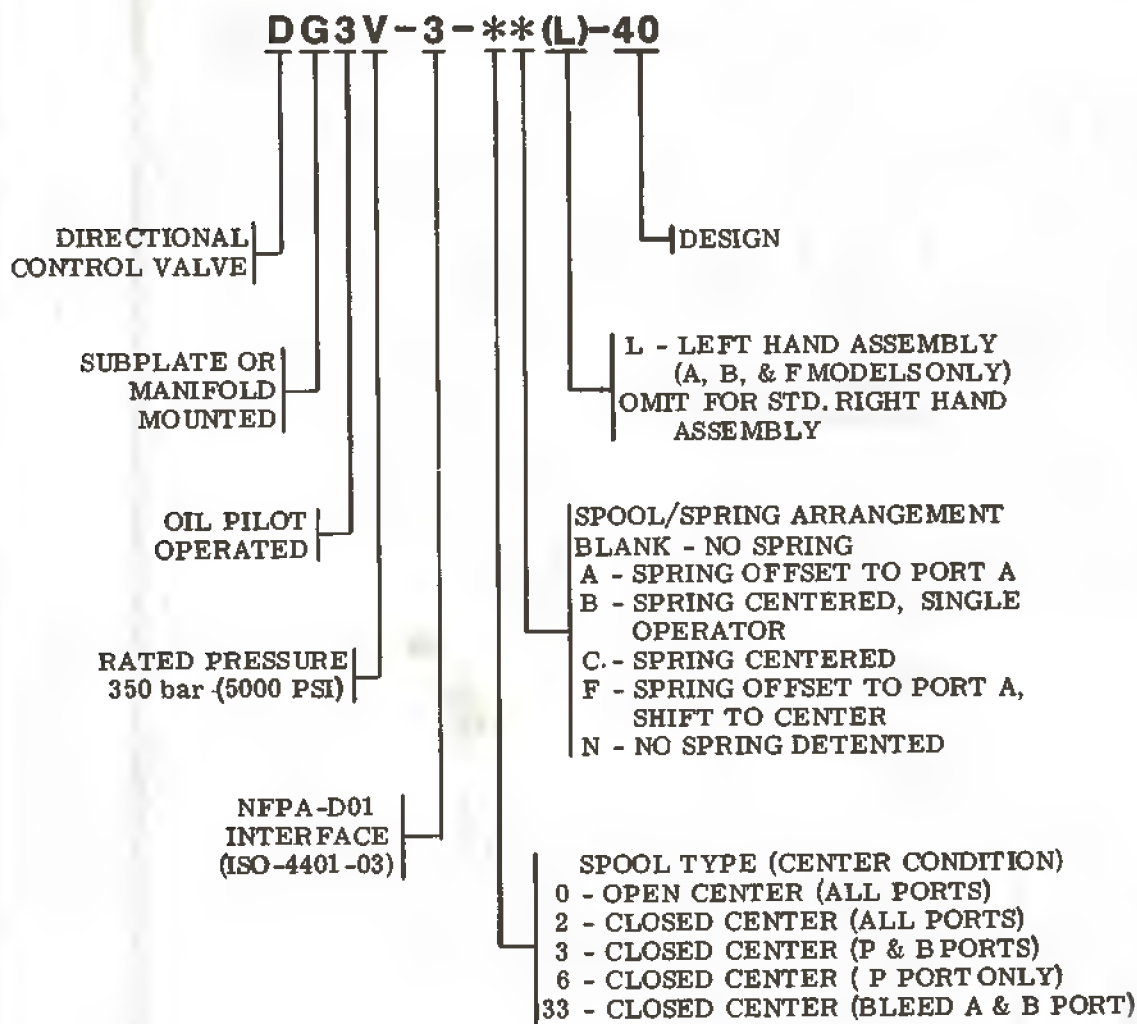
▲ INCLUDED IN
941219 DETENT KIT

▲ INCLUDED IN
920324 SEAL KIT

SPOOL TYPES	SPOOL
0 A/A2/C	683222
0 N	683219
2 A/A2/C	683223
2 N	989729
6 A/A2/C	683224
6 N	989730
7 N	683220
33 A/A2/C	683225
33 N	683221

■ 926482 FASTENER KIT
TORQUE 7.4 - 9.0 N.m
(65.0 - 79.6 lb. in.)

MODEL CODE BREAKDOWN



AS THIS COMPLETE UNIT CAN BE REPLACED AT A NOMINAL COST, FACTORY REPAIR IS NOT PRACTICAL. KITS ARE AVAILABLE TO SUPPORT CUSTOMER REPAIR.

For satisfactory service life of these components, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from OFF, OFR and OFRS filter series are recommended.

Litho in U. S. A.

Service Parts Information

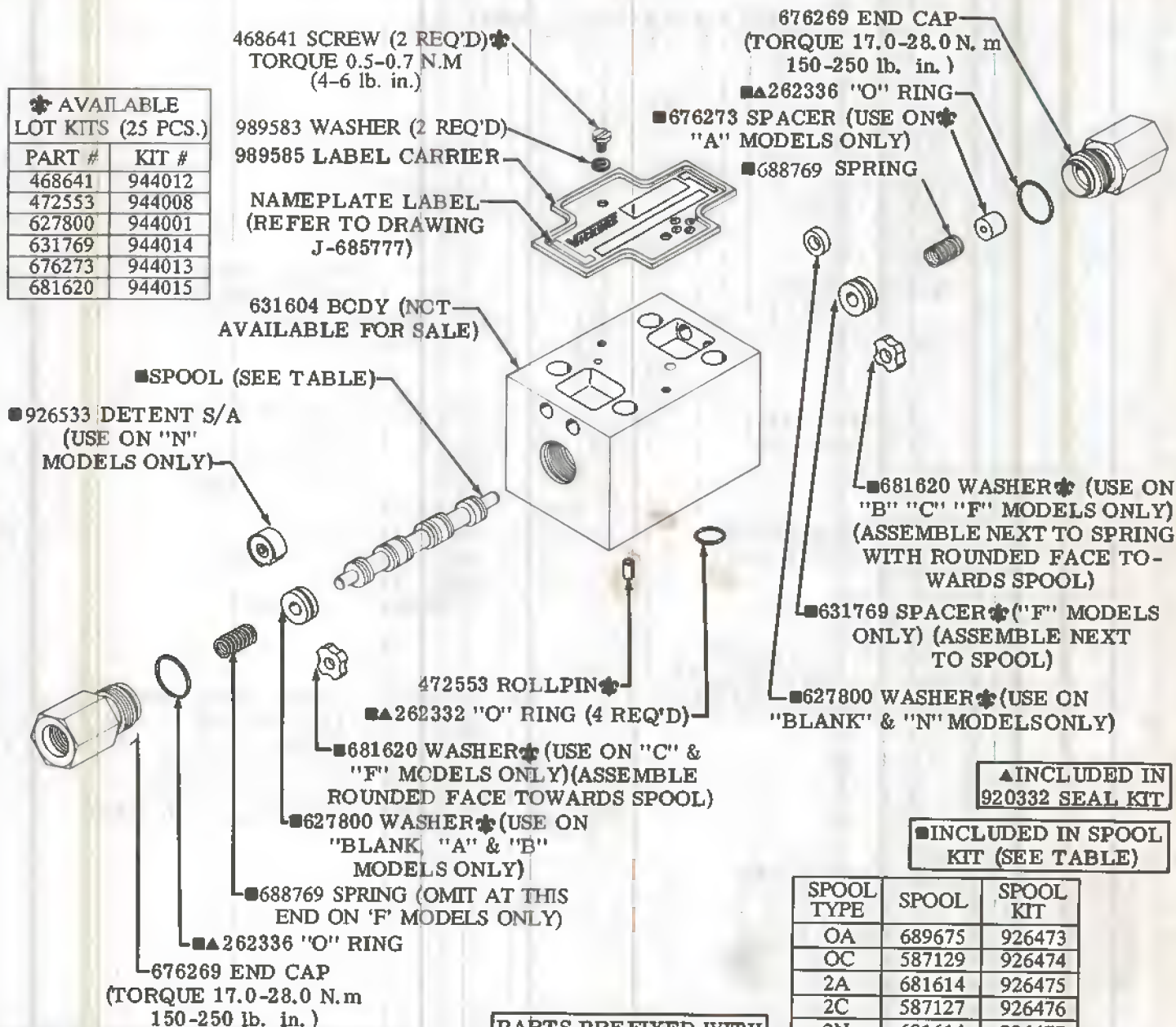
OIL PILOT OPERATED MINIATURE 4-WAY DIRECTIONAL VALVE

DG3V-3-**(L)-40

VICKERS

A TRIMONA COMPANY

* AVAILABLE LOT KITS (25 PCS.)	
PART #	KIT #
468641	944012
472553	944008
627800	944001
631769	944014
676273	944013
681620	944015



R. H. ASSEMBLY SHOWN, FOR ALL
SINGLE OPERATOR MODELS. FOR
L. H. ASSEMBLY, ALL PARTS ARE
REVERSED EXCEPT BODY FOR "A"
MODELS, OR BODY & SPOOL FOR
"B" & "F" MODELS

PARTS PREFIXED WITH
SYMBOL AVAILABLE
ONLY IN KITS.

▲ INCLUDED IN
920332 SEAL KIT

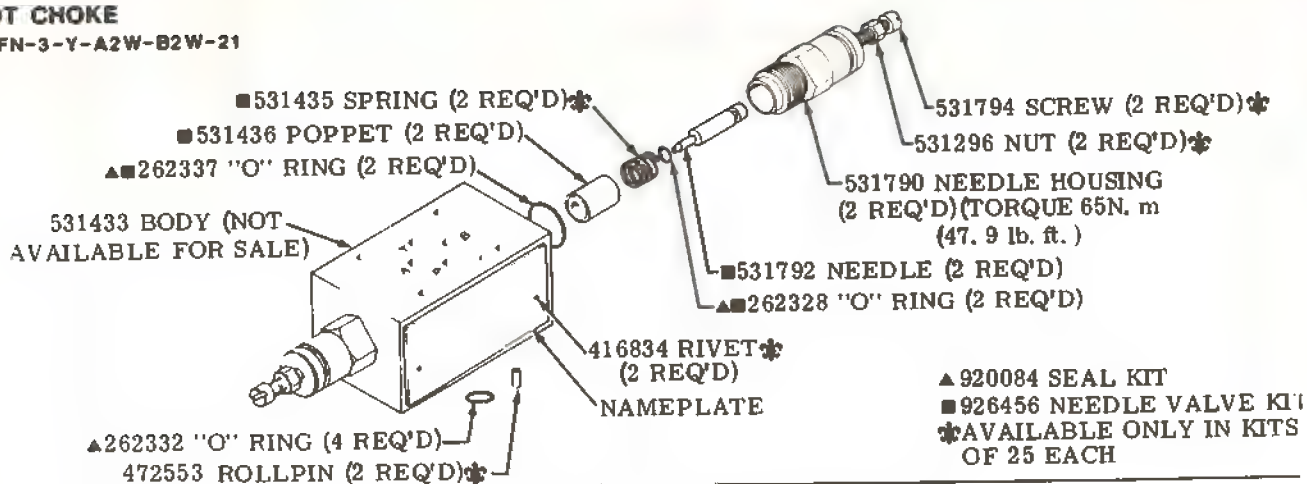
■ INCLUDED IN SPOOL
KIT (SEE TABLE)

SPOOL TYPE	SPOOL	SPOOL KIT
OA	689675	926473
OC	587129	926474
2A	681614	926475
2C	587127	926476
2N	681614	926477
3C	590501	926589
6*	681615	926478
6A	681615	926479
6N	587130	926480

ASSEMBLE TYPE 3 SPOOL
WITH NARROW CENTER
LAND TOWARDS 'A' PORT.

PILOT CHOKE

DGMFN-3-Y-A2W-B2W-21



MODEL CODE BREAKDOWN

(F3)DG5S4-10**(P)(L)(X)-(*)-(E)-(T)(*)-M(P**)-M-***-*(9)-(**)-70											
SEALS FOR MINERAL OIL & FIRE RESISTANT FLUIDS		DIRECTIONAL CONTROL VALVE MANIFOLD OR SUBPLATE MOUNTED. SOL- ENOID CONTROLLED, PILOT OPERATED, SLIDING SPOOL. 4 WAY FLOW DIRECTION	VALVE SIZE 1-1/4" NFPA-D10 (ISO-4401-10) INTERFACE	SPOOL TYPES	SPOOL SPRING ARRANGEMENT A-SPRING OFFSET TO CYL. A B-SPRING CENTERED SOLENOID A REMOVED C-SPRING CENTERED N-NO SPRING DETENTED	MANUAL OPERATOR IN PILOT VALVE END CAP. A & B MODELS ONLY *	LEFT HAND (SINGLE SOLENOID ONLY) *	X - FAST RESPONSE (OMIT FOR STD. LOW SHOCK MODELS)	T - INTERNAL PILOT DRAIN *	E - EXTERNAL PILOT PRESSURE *	DESIGN
											PILOT VALVE PORT ORIFICE *
											LOW WATTAGE B COIL *
											COIL IDENTIFICATION LETTER
											U-DIN 43650 W-WIRING HSG. 1/2 NTP. THD. WL-WIRING HSG. 1/2 NPT. THD. (WITH INDICATOR LIGHT)
											DG4V-3 PILOT VALVE & ADAPTER PLATE
											ELECTRICAL FEATURES REFER TO 1-3866-S FOR DETAILED INFORMATION
											FLAG SYMBOL HEADING ELECTRICAL FEATURES AND OPTIONS
											CHECK VALVE IN PRESSURE PORT * K-0.35 bar(5 PSI CRACKING PRESS.) R-3.45 bar(50 PSI CRACKING PRESS.) S-5.20 bar(75 PSI CRACKING PRESS.)

* - OMIT WHEN NOT REQ'D

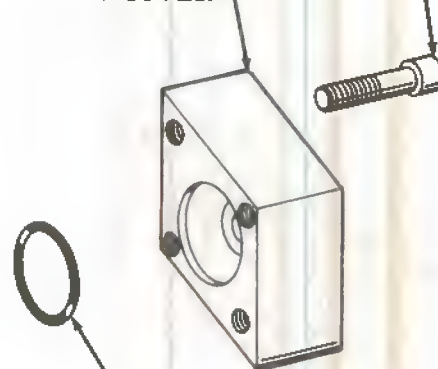
For satisfactory service life of these components, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from Vickers OFF, OFR, and OFRS series are recommended.

Litho in U. S. A.

255651 BOLT KIT (TORQUE TO 11.3-12.7 N.m) (100-112 lb. in.)

▲262334 "O" RING (5 REQ'D)

276948 COVER-



▲262409 "O" RING

280931 SPRING

107758 WASHER

REMOVE ON "A" OFFSET MODELS

LUG
RING
T"
ELS)
LUG
ING

／*■407533 PLUG

-▲263493 "O" RING

263493 "O" RING (2 REQ'D)

■407533 PLUG (2 REQ'D)

▲263493 'O' RING (2 REQ'D)

■407533 PLUG (2 REQ'D)

■"B" P UG (SEE TABLE)■

—▲263495 "O" RING

■363889 LUG

^195940 REST PI (2 REQ'D)

▲262389 "O" RING

-▲ 263493 "O" RIN

*■363889 PLUG

★**34374** PLUG (2 REQ'D)★

▲ 263494 "O" RING (2 REQ'D)

▲262401 "O" RING (3 REQ')CHECK VALVE
(4 REQ'D) STD A, B, P & T PORTS

245802 SLEEVE

SPRING (SEE TABLE)

6422 VALVE

289102 SEAT (MUST BE
PRESSED TO BOTTOM)

262403 "O" RING

SPRING
247287
276428
432353

PLUG	N. m	lb. in.
7074	8.5-9.6	75-85
30560	8.5-9.6	75-85
113000	5.0-5.9	45-52
161809	5.0-5.9	45-52
343740	15.0-16.0	133-147
363889	20.5-22.5	181-199
407533	12.1-12.4	107-110

■ PLUG INSTALLATION TABLE			
MODEL	"A" PLUG	"B" PLUG	"C" PLUG
DG5S4-10*-70	DOES NOT EXIST	30560	—
DG5S4-10*-E-70		7074	30560
DG5S4-10*-X-70		OUT	—
DG5S4-10*-X-E-70		7074	—
DG5S4-10*-K/R/S-70	161809		30560
DG5S4-10*-E-K/F/S-70	113000		
DG5S4-10*-X-K/R/S-70	—		
DG5S4-10*-X-E-K/R/S-70	113000	—	

MODEL	"A" PLUG	"B" PLUG	"C" PLUG
DG5S4-10*-70	DOES NOT EXIST	30560	—
DG5S4-10*-E-70		7074	30560
DG5S4-10*-X-70		OUT	—
DG5S4-10*-X-E-70		7074	—
DG5S4-10*-K/R/S-70	161809		—
DG5S4-10*-E-K/F/S-70	113000		—
DG5S4-10*-X-K/R/S-70	—		30560
DG5S4-10*-X-E-K/R/S-70	113000	—	—

VALVE MODEL CODE	MAIN STAGE SPOOL TYPE	PILOT VALVE MODEL CODE	SERVICE DWG.
DG5S4-10*A-M-(*)-M-*-70	0, 1, 2, 3, 6, 9, 11, 31, 33	DG4V-3-2A-M-*-40	I-3861-S
	4 & 8	DG4V-3-28A-M-*-40	
DG5S4-10*B-M-(*)-M-*-70	0, 1, 2, 3, 6, 9, 11, 31, 33	DG4V-3-6B-M-*-40	I-3862-S
	4 & 8	DG4V-3-68B-M-*-40	
DG5S4-10*C-M-(*)-M-*-70	0, 1, 2, 3, 6, 9, 11, 31, 33	DG4V-3-6C-M-*-40	I-3863-S
	4 & 8	DG4V-3-68C-M-*-40	
DG5S4-10*N-M-(*)-M-*-70	0, 1, 2, 3, 6, 9, 11, 31, 33	DG4V-3-6N-M-*-40	I-3865-S
	4 & 8	DG4V-3-68N-M-*-40	

THIS SOL. REMOVED
ON A & B R. H. MODELS.
REFER TO PARTS DWG
FOR L. H. MODELS.

▲262332 "O" RING (4 REQ'D)

*■113000 PLUG (4 RE

422814 ADAPTER

MAIN STAGE SPOOL	AVAILABLE VALVE TYPE	SPOOL	MAIN STAGE ID PLATE	
			A ONLY	B/C/N
DG5S4-100	A/B/C/N	364037	400975	400976
DG5S4-101		*331404		400977
DG5S4-102		364038		400978
DG5S4-103		*277479		400979
DG5S4-104		281193		400980
DG5S4-106		364039		400981
DG5S4-108		364041		400980
DG5S4-109		277563		400976
DG5S4-1011		*331404		632700
DG5S4-1031		*277479		580475
DG5S4-1033		364042		400981

*NOTE

ASSEMBLE TYPE 1 & 3 SPOOLS WITH NARROW CENTER
LAND TOWARD "A" END OF VALVE. "A" END IS DEFINED
AS BEING CLOSEST TO CYL. PORT "A". TYPES 11 & 31
SPOOLS ARE INSTALLED IN REVERSE OF TYPES 1 & 3,
WITH NARROW CENTER LAND TOWARD "B" END OF
VALVE.

*■36

▲26349

*■7074 PLUG (REMOVE
INTERNAL PILOT DRA

*■40

▲263493

416834 RIVET (4 REQ'D)

I.D. PLATE WITH
CIRCUIT DIAGRAM
(SEE TABLE)

▲263493 "O" RING

*■407533 PLUG

◆400959 BODY (STD)

◆435503 BODY
(CHECK VLV)

SPOOL (SEE TABLE)

*■407533 PLUG

▲263493 "O" RING

*■"C" PLUG

▲262389 "O" RING

*■"A" PLUG

▲263493 "O" RING

*■407533 PLUG

REMOVE ON "A"
OFFSET MODELS

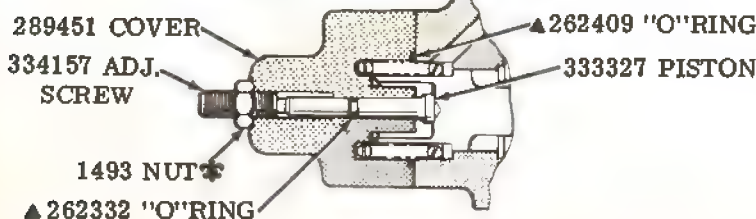
SEAL KIT NOTE

Valves are manufactured with F3 seals
used internally. Interface seals are std
Nitrile material and are converted to F3
in seal kit. All seal kit seals are F3.

MOD
-K-M
-R-M
-S-M

- ▲ INCLUDED IN F3 SEAL KIT 920315
- * INCLUDED IN PLUG KIT 941263
- ◇ INCLUDED IN FASTENER KIT 941262
- ◆ USED ON CHECK VALVE MODELSONLY
- PLUG TORQUES (SEE TABLE)
- ◆ NOT AVAILABLE FOR SALE
- ◆ AVAILABLE ONLY IN KIT OF 25 EACH
- SAE STRAIGHT THREAD PLUGS
USED ON EXTERIOR OF VALVE
- PARTS INCLUDED IN SERVICE
KITS NCT SOLD SEPARATELY

STROKE ADJUSTMENT PARTS (EITHER END OF VALVE OR BOTH ENDS)



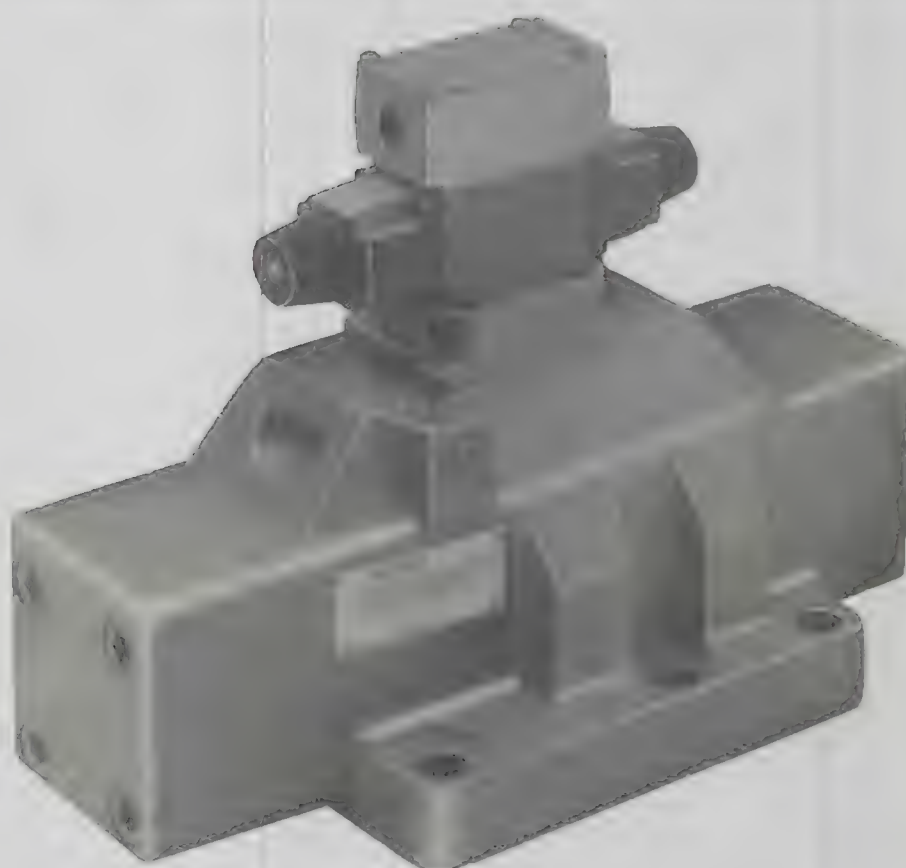
VICKERS®

A TRIMONA COMPANY

Service Parts Information

Solenoid Controlled
Pilot Operated
Directional Valves

DG5S4-10-**-*-M-**-M-**-*-70



Vickers, Incorporated

1401 Crooks Road
Troy, Michigan 48064

Revised 12-1-87

I-3870-S

PGMFN-3-Y-A2W-B2W-21

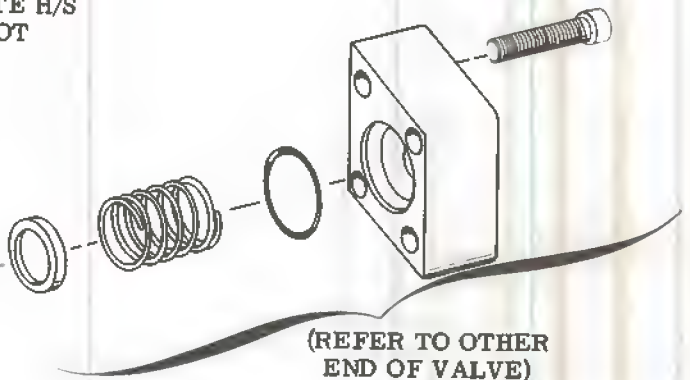
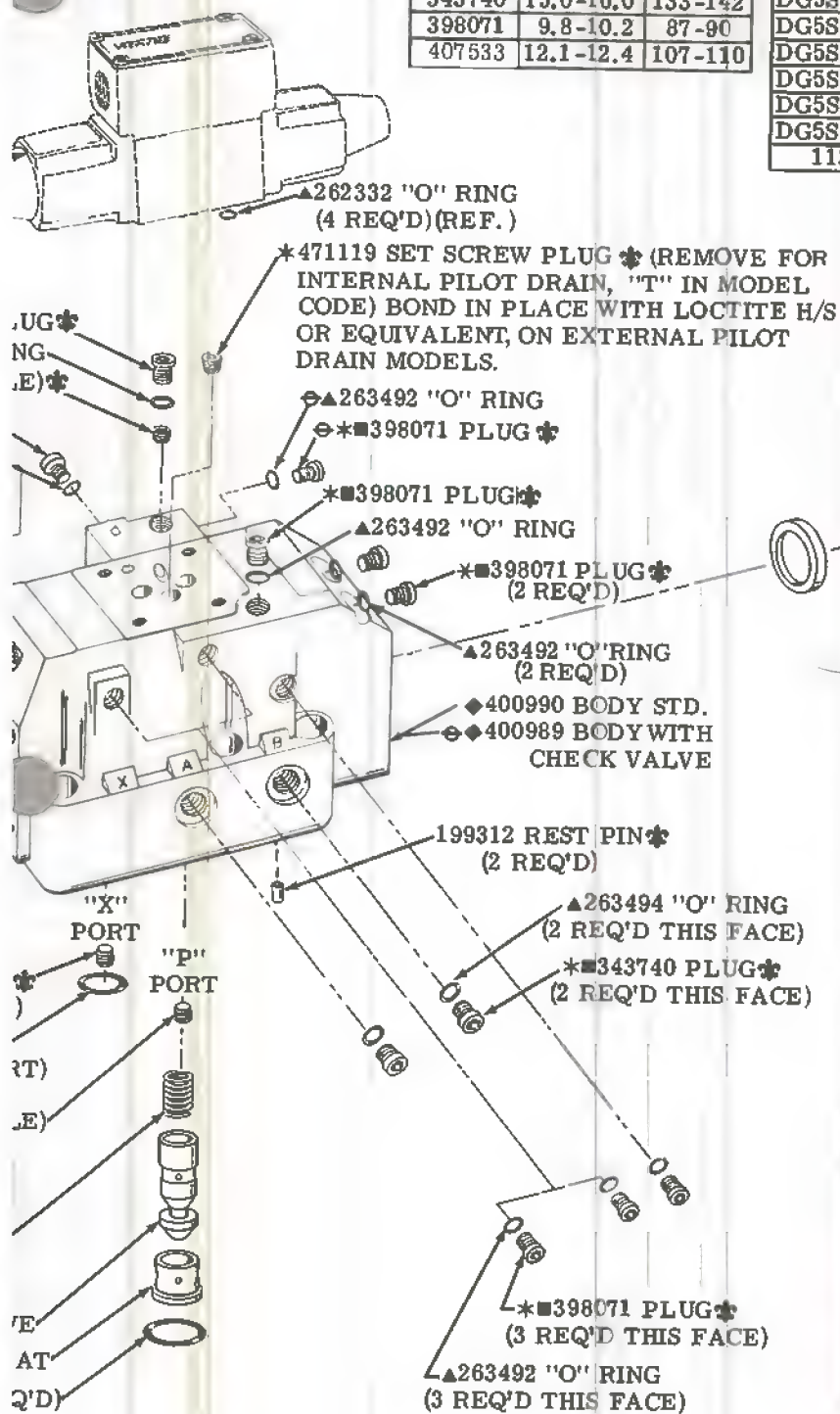


- 1 -STROKE ADJUSTMENT
- 2 -PILOT CHOKE ADJUSTMENT
- 3 -PILOT CHOKE & STROKE ADJ.
- 7 -STROKE ADJ. CYL. "A" ONLY
- 8 -STROKE ADJ. CYL. "B" ONLY
- 2-7 -DUAL PILOT CHOKE & STROKE
ADJ. "A" PORT END ONLY.
- 2-8 -DUAL PILOT CHOKE & STROKE
ADJ. "B" PORT END ONLY.

Litho in U. S. A.

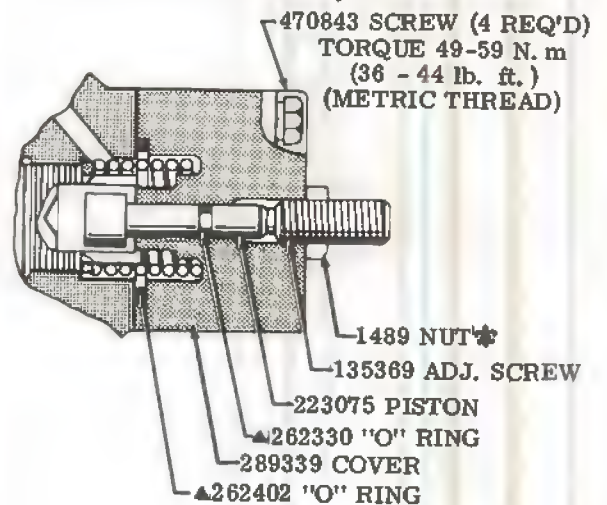
■ PLUG	TORQUES (OILED)	
	N. m	lb. in.
113000	5.0- 5.9	45-52
237588		
343740	15.0-16.0	133-142
398071	9.8-10.2	87-90
407533	12.1-12.4	107-110

■ PLUG INSTALLATION TABLE			
MODEL	"A" PLUG	"B" PLUG	"C" PLUG
DG5S-8-**-20	DOES NOT EXIST	237588	—
DG5S-8-**-E-20		113000	237588
DG5S-8-**-X-20		—	—
DG5S-8-**-X-E-20		113000	—
DG5S-8-**-KRS-20	237588	DOES NOT EXIST	237588
DG5S-8-**-E-KRS-20	113000		
DG5S-8-**-X-KRS-20	—		
DG5S-8-**-X-E-KRS-20	113000		
113000 SOLID PLUG		237588 ORIFICE PLUG	



- PARTS PREFIXED WITH SYMBOL AVAILABLE ONLY IN KITS.
- ALL THREADED FASTENERS ARE METRIC.
- END COVER SCREWS ARE METRIC GRADE 12. 9.

PARTS SHOWN INCLUDED IN STROKE ADJ. KIT 941154. ORDER TWO KITS IF STROKE ADJ. IS REQ'D BOTH ENDS.



MAIN STAGE SPOOL	AVAILABLE VALVE TYPE	SPOOL	MAIN STAGE ID PLATE	
			"A" ONLY	B/C/F/N
DG5S-8-0	A/B/C/F/N	363495	400975	400976
DG5S-8-1		*276623		400977
DG5S-8-2		363496		400978
DG5S-8-3		*276625		400979
DG5S-8-4		276626		400980
DG5S-8-6		363498		400981
DG5S-8-8		363499		400980
DG5S-8-9		363500		400976
DG5S-8-11		*276623		632700
DG5S-8-31		*276625		580475
DG5S-8-33		363501		400981
DG5S-8-52/521	C	*420583	—	573685

***NOTE**

ASSEMBLE TYPE 1 & 3 SPOOLS WITH NARROW CENTER LAND TOWARD "A" END OF VALVE. "A" END IS DEFINED AS BEING CLOSEST TO CYL. PORT "A". TYPE 11 & 31 SPOOLS ARE INSTALLED IN REVERSE OF TYPE 1 & 3 WITH NARROW CENTER LANDS TOWARD "B" END OF VALVE. ASSEMBLE TYPE 52 SPOOL WITH TWO NARROW CENTER LANDS TOWARD CYL. "B" END OF VALVE. ASSEMBLE TYPE 521 SPOOL WITH TWO NARROW CENTER LANDS TOWARD CYL. "A" END OF VALVE.

▲ INCLUDED IN F3 SEAL KIT 920312

* INCLUDED IN PLUG KIT 941167

□ INCLUDED IN FASTENER KIT 941165

◆ NOT AVAILABLE FOR SALE

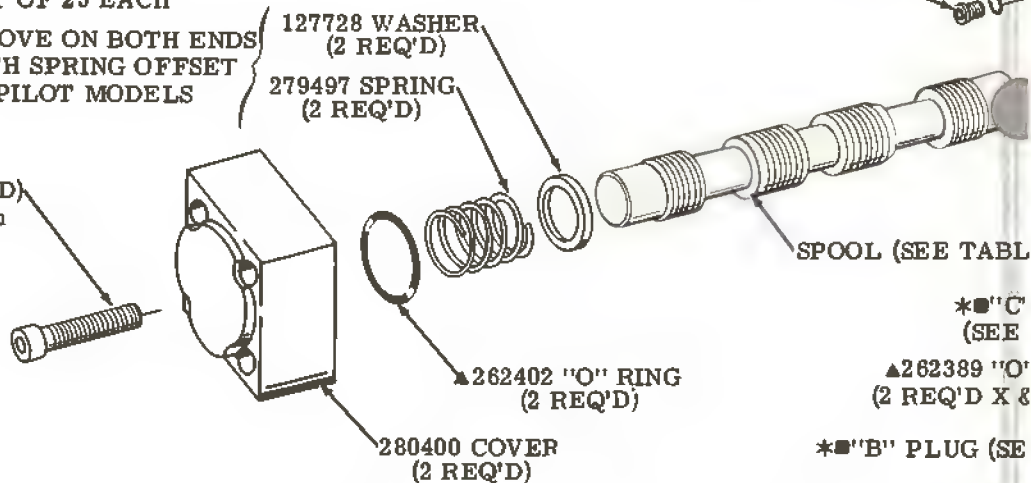
⊖ USED ON CHECK VALVE MODELS ONLY

■ PLUG TORQUES (SEE TABLE)

✱ AVAILABLE ONLY IN KIT OF 25 EACH

REMOVE ON BOTH ENDS
WITH SPRING OFFSET
PILOT MODELS

□ 473784 SCREW (8 REQ'D)
TORQUE TO 49-59 N. m
(36 - 44 lb. ft.)



PILOT STAGE ATTACHING BOLTS BOLT KIT INCLUDES 4 BOLTS	
MODEL	BOLT KIT
W/OUT PILOT CHOKE	255699
W/PILOT CHOKE	466838
TORQUE TO 4.5-5.7 N. m (39.8 - 50.4 lb. in.)	
SEE BACK PAGE FOR PILOT CHOKE PARTS BREAKDOWN	

THIS SOLENOID REMOVED ON
R.H. "A", "B", & "F" MODELS.
REFER TO SERVICE DWGS FOR
L. H. MODELS.

*407

▲ 263493

⊖ * "A" PLUG (SEE

⊖ * 398071 PI

⊖ ▲ 263492 "O" RI

416834 RIVET (4 REQ'D)

ID PLATE (SEE TABLE)

▲ 263492 "O" RING (2 REQ'D)

* 398071 PLUG (2 REQ'D)

* "C"

(SEE

▲ 262389 "O"

(2 REQ'D X 8

* "B" PLUG (SE

VALVE MODEL CODE	MAIN STAGE SPOOL TYPE	PILOT VALVE MODEL CODE	SERVICE DWG.
DG5S-8-*A-M-*-20	0, 1, 2, 3, 6, 9, 11, 31, 33 4 & 8	DG4V-3-2A-M-*-40 DG4V-3-28A-M-*-40	I-3861-S
DG5S-8-*B-M-*-20	0, 1, 2, 3, 6, 9, 11, 31, 33 4 & 8	DG4V-3-6B-M-*-40 DG4V-3-68B-M-*-40	I-3862-S
DG5S-8-*C-M-*-20	0, 1, 2, 3, 6, 9, 11, 31, 33, 52, 521 4 & 8	DG4V-3-6C-M-*-40 DG4V-3-68C-M-*-40	I-3863-S
DG5S-8-*F-M-*-20	0, 1, 2, 3, 6, 9, 11, 31, 33 4 & 8	DG4V-3-6F-M-*-40 DG4V-3-68F-M-*-40	I-3864-S
DG5S-8-*N-M-*-20	0, 1, 2, 3, 6, 9, 11, 31, 33 4 & 8	DG4V-3-6N-M-*-40 DG4V-3-68N-M-*-40	I-3865-S

MODEL	⊖ SPRING	⊖ C
DG5S-8-***-K-*-20	398130	-
DG5S-8-***-R-*-20	398131	YE
DG5S-8-***-S-*-20	398132	-

⊖ 58044

⊖ 58

▲ 262394 "O" RING
(A, B, P & T

Service Parts Information

**Solenoid Controlled
Pilot Operated
Directional Valves**

DG5S-8-**-*(-)-M-**-*-20



Vickers, Incorporated

P.O. Box 302
Troy, Michigan 48007-0302

Released 5-1-86

I-3869-S

PGMFN-3-Y-A2W-B2W-21



(F3)DG5S-H8-**(P)(L)(X)-(*)-(E)-(T)(*)-M(P**)---*(9)-(**)---50

- 1 -STROKE ADJUSTMENT
- 2 -PILOT CHOKE ADJUSTMENT
- 3 -PILOT CHOKE & STROKE ADJ.
- 7 -STROKE ADJ. CYL. "A" ONLY
- 8 -STROKE ADJ. CYL. "B" ONLY
- 7 -DUAL PILOT CHOKE & STROKE
ADJ. "A" PORT END ONLY.
- 8 -DUAL PILOT CHOKE & STROKE
ADJ. "B" PORT END ONLY.

Litho in U. S. A.

PLUG	TORQUES (OILED)	
	N. m	lb. in.
113000	5.0- 5.9	45-52
237588		
343740	15.0-16.0	133-142
398071	9.8-10.2	87-90
407533	12.1-12.4	107-110

■ PLUG INSTALLATION TABLE			
MODEL	"A" PLUG	"B" PLUG	"C" PLUG
DG5S-H8-**-50	DOES NOT EXIST	237588	—
DG5S-H8-**-E-50		113000	237588
DG5S-H8-**-X-50		OUT	—
DG5S-H8-**-X-E-50		113000	—
DG5S-H8-**-KRS-50	237588	DOES NOT EXIST	—
DG5S-H8-**-E-KRS-50	113000		237588
DG5S-H8-**-X-KRS-50	—		—
DG5S-H8-**-X-E-KRS-50	113000		—
*113000 SOLID PLUG		*237588 ORIFICE PLUG	

▲262332 "C" RING (REF.)
(4 REQ'D)

*471119 SET SCREW - REMOVE FOR INTERNAL PILOT DRAIN, "T" IN MODEL CODE. BOND IN PLACE WITH LOCTITE H/S OR EQUIVALENT ON EXTERNAL PILOT DRAIN MODELS.

REFER TO OTHER
END OF VALVE

▲262492 "O" RING

*398071 PLUG

*398071 PLUG

▲263492 "O" RING

▲263492 "O" RING
(2 REQ'D)

*398071 PLUG
(2 REQ'D)

◆573675 BCDY STD

◆577493 BODY CHECK
VALVE

199312 REST PIN
(2 REQ'D)

▲263494 "O" RING (2 REQ'D
THIS FACE)

*343740 PLUG (2 REQ'D
THIS FACE)

*398071 PLUG (3 REQ'D
THIS FACE)

▲263492 "O" RING (3 REQ'D
THIS FACE)

- PARTS PREFIXED WITH SYMBOL
AVAILABLE ONLY IN KITS
- ALL THREADED FASTENERS ARE
METRIC.
- END COVER SCREWS ARE METRIC
GRADE 12. 9.

PARTS SHOWN INCLUDED IN 941156
STROKE ADJUSTMENT KIT. ORDER
2 KITS IF STROKE ADJUSTMENT IS
REQUIRED FOR BOTH ENDS.

470844 SCREW (4 REQ'D)
TORQUE 49-59 N. m
(36 - 44 lb. ft.)

471207 ADJ.
SCREW

470684 NUT

787125 COVER

787127 PISTON

▲197573 BACK-UP RING

▲262335 "O" RING

▲262403 "O" RING

MAIN STAGE SPOOL	AVAILABLE VALVE TYPE	SPOOL	MAIN STAGE ID PLATE	
			A ONLY	B/C/N
DG5S-H8-0	A/B/C/N	786350	400975	400976
DG5S-H8-1		*786557		400977
DG5S-H8-2		786349		400978
DG5S-H8-3		*786558		400979
DG5S-H8-4		628162		400980
DG5S-H8-6		786559		400981
DG5S-H8-8		627221		400980
DG5S-H8-9		786561		400976
DG5S-H8-11		*786557		632700
DG5S-H8-31		*786558		580475
DG5S-H8-33		786562		400981

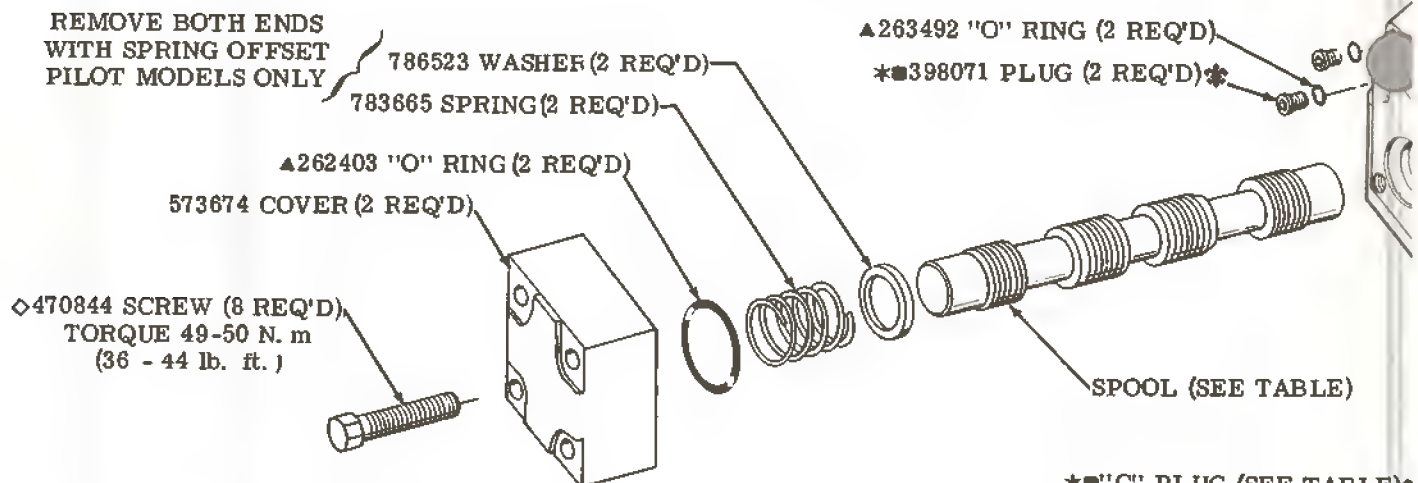
***NOTE**

ASSEMBLE TYPE 1 & 3 SPOOLS WITH NARROW CENTER LAND TOWARD "A" END OF VALVE. "A" END IS DEFINED AS BEING CLOSEST TO CYL. PORT "A". TYPES 11 & 31 SPOOLS ARE INSTALLED IN REVERSE OF TYPES 1 & 3, WITH NARROW CENTER LAND TOWARD "B" END OF VALVE.

- ▲ INCLUDED IN F3 SEAL KIT 920311
- * INCLUDED IN PLUG KIT 941167
- ◇ INCLUDED IN FASTENER KIT 941175
- ◆ NOT AVAILABLE FOR SALE
- ⊕ USED ON CHECK VALVE MODELS ONLY
- PLUG TORQUES (SEE TABLE)
- ⊕ AVAILABLE ONLY IN KIT OF 25 EACH

PILOT STAGE ATTACHING BOLTS BOLT KIT INCLUDES 4 BOLTS	
MODEL	BOLT KIT
W/OUT PILOT CHOKE	255699
WITH PILOT CHOKE	466838
TORQUE TO 4.5-5.7 N. m (39.8 - 50.4 lb. in.)	
SEE BACK PAGE FOR PILOT CHOKE PARTS BREAKDOWN	

THIS SOLENOID REMOVED ON R. H. "A" AND "B" MODELS. REFER TO SERVICE DWGS FOR L. H. MODELS.



VALVE MODEL CODE	MAIN STAGE SPOOL TYPE	PILOT VALVE MODEL CODE	SERVICE DWG.
DG5S-H8-*A-M-*-50	0, 1, 2, 3, 6, 9, 11, 31, 33	DG4V-3-2A-M-*-40	I-3861-S
	4 & 8	DG4V-3-28A-M-*-40	
DG5S-H8-*B-M-*-50	0, 1, 2, 3, 6, 9, 11, 31, 33	DG4V-3-6B-M-*-40	I-3862-S
	4 & 8	DG4V-3-68B-M-*-40	
DG5S-H8-*C-M-*-50	0, 1, 2, 3, 6, 9, 11, 31, 33	DG4V-3-6C-M-*-40	I-3863-S
	4 & 8	DG4V-3-68C-M-*-40	
DG5S-H8-*N-M-*-50	0, 1, 2, 3, 6, 9, 11, 31, 33	DG4V-3-6N-M-*-40	I-3865-S
	4 & 8	DG4V-3-68N-M-*-40	

MODEL	⊕ SPRING	COLOR CODE
-K-	398130	—
-R-	398131	YELLOW
-S-	398132	RED

Service Parts Information

**Solenoid Controlled
Pilot Operated
Directional Valves**

DG5S-H8-**-**-M-**-**-50



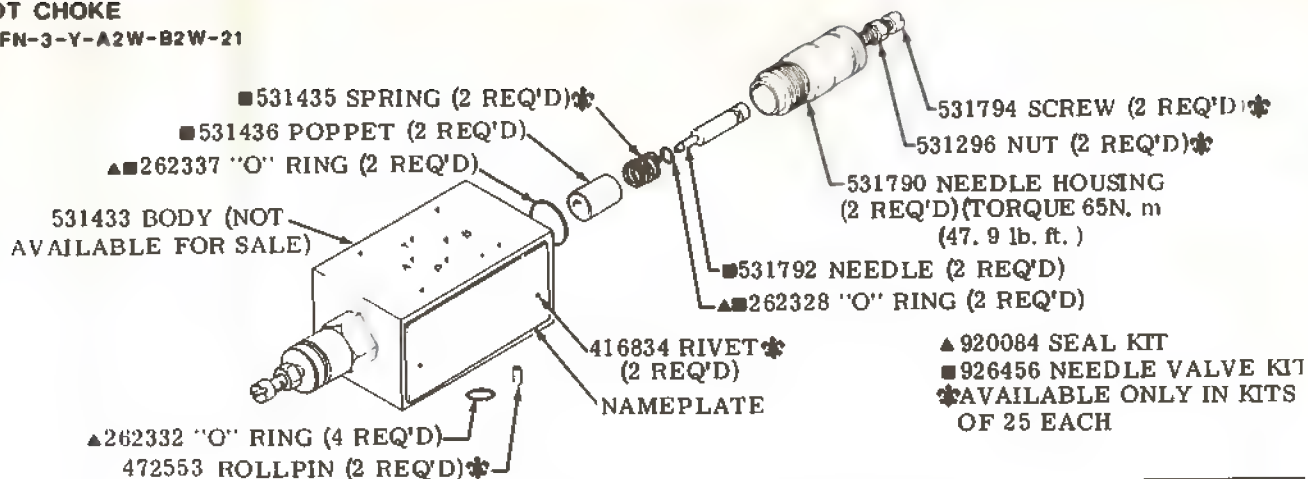
Vickers, Incorporated

P.O. Box 302
Troy, Michigan 48007-0302

Released 5-1-86

I-3868-S

PILOT CHOKE
DGMFN-3-Y-A2W-B2W-21



MODEL CODE BREAKDOWN

(F3)DG5S4-04-**(P)(L)(X)-(*)-(E)-(T)(*)-M(P**)-**-*(9)-(**)-50														
														DESIGN
														PILOT VALVE PORT ORIFICE *
														LOW WATTAGE B COIL *
														CCIL IDENTIFICATION * LETTER
														U - DIN 43650 W - WIRING HSG. 1/2 NPT. THD. WL - WIRING HSG. 1/2 NPT. THD. (WITH INDICATOR LIGHT)
														ELECTRICAL FEATURES REFER TO I-3866-S FOR DETAILED INFORMATION
														FLAG SYMBOL HEADING ELECTRICAL FEATURES AND OPTIONS
														CHECK VALVE IN PRESSURE PORT * K-0.35 bar (5 PSI CRACKING PRESS.) R-3.45 bar (50 PSI CRACKING PRESS.) S-5.20 bar (75 PSI CRACKING PRESS.)
														T - INTERNAL PILOT DRAIN *
														E - EXTERNAL PILOT PRESSURE *
														SPOOL CONTROL MODIFICATIONS *
														1 - STROKE ADJUSTMENT
														2-PILOT CHOKE ADJUSTMENT
														3-PILOT CHOKE & STROKE ADJ.
														7-STROKE ADJ. CYL. "A" ONLY
														8-STROKE ADJ. CYL. "B" ONLY
														2-7-DUAL PILOT CHOKE & STROKE ADJ. "A" PORT END ONLY.
														2-8-DUAL PILOT CHOKE & STROKE ADJ. "B" PORT END ONLY.
SEALS FOR MINERAL OIL & FIRE RESISTANT FLUIDS														
DIRECTIONAL CONTROL VALVE MANIFOLD OR SUBPLATE MOUNTED. SOLENOID CONTROLLED PILOT OPERATED. RATED PRESSURE 210 bar (3000 PSI)														
INTERFACE NFPA-D04 (ISO-4401-07)														
SPOOL TYPES														
SPOOL SPRING ARRANGEMENT A-SPRING OFFSET TO CYL. A B-SPRING CENTERED SOLENOID A REMOVED C-SPRING CENTERED N-NO SPRING DETENTED														
MANUAL OPERATOR IN PILOT VALVE END CAP. A & B MODELS ONLY *														
LEFT HAND (SINGLE SOLENOID ONLY *)														
X - FAST RESPONSE (OMIT FOR STD. LOW SHOCK MODELS)														

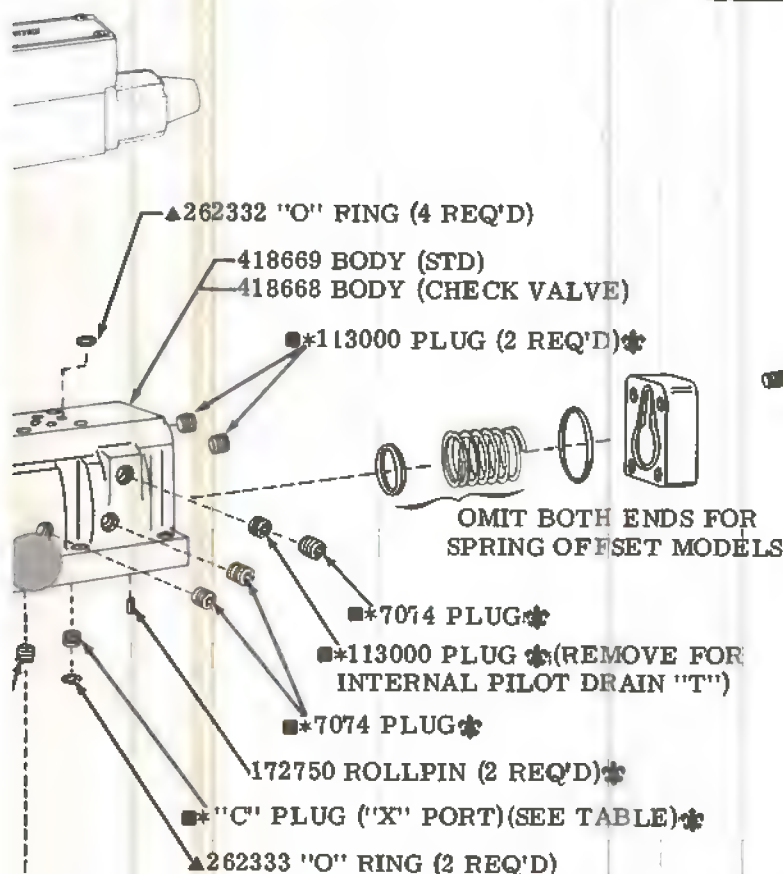
* - OMIT WHEN NOT REQ'D

For satisfactory service life of these components, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from Vickers OFFP, OFR, and OFRS series are recommended.

Litho in U. S. A.

PILOT STAGE ATTACHING BOLTS BOLT KIT INCLUDES 4 BOLTS	
MODEL	BOLT KIT
W/OUT PILOT CHOKE	255698
WITH PILOT CHOKE	466851
TORQUE TO 5.6 N. m MAX. (45 - 50 lb. in.)	
SEE BACK PAGE FOR PILOT CHOKE PARTS BREAKDOWN	

■ PLUG INSTALLATION TABLE				
	MODEL	"A" PLUG	"B" PLUG	"C" PLUG
	DG5S4-04--M--*-50	DOES NOT EXIST	367427	OUT
	DG5S4-04--X-M--*-50		OUT	
	DG5S4-04--E-M--*-50			367427
	DG5S4-04--X-E-M--*-50		113000	OUT
	DG5S4-04--K/R/S-M--*-50	367427		
	DG5S4-04--X-K/R/S-M--*-50	OUT		
	DG5S4-04--E-K/R/S-M--*-50			367427
	DG5S4-04--X-E-K/R/S-M--*-50	113000		OUT
*113000 SOLID PLUG		*367427 ORIFICE PLUG		



■ PLUG TORQUES (OILED)		
PLUG	N. m	lb. in.
7074	8.5-9.6	75-85
113000	5.0-5.9	45-52
367427	5.0-5.9	45-52

*INCLUDED IN
PLUG KIT 926545

▲INCLUDED IN F3
SEAL KIT 920314

MAIN STAGE SPOOL	AVAILABLE VALVE TYPE	SPOOL	MAIN STAGE ID PLATE	
			A ONLY	B/C/N
DG5S4-040	A/B/C/N	399891	433851	433852
DG5S4-041		*431972		433851
DG5S4-042		399892		433853
DG5S4-043		*399893		433854
DG5S4-044		413481		433855
DG5S4-046		399894		433856
DG5S4-048		399896		433855
DG5S4-049		413483		433852
DG5S4-0411		*431972		433851
DG5S4-0431		*399893		433851
DG5S4-0433		399897		433856

***NOTE**

ASSEMBLE TYPE 1 & 3 SPOOLS WITH NARROW CENTER LAND TOWARD 'A' END OF VALVE. 'A' END IS DEFINED AS BEING CLOSEST TO CYL. PORT 'A'. TYPES 11 & 31 SPOOLS ARE INSTALLED IN REVERSE OF TYPES 1 & 3, WITH NARROW CENTER LAND TOWARD 'B' END OF VALVE.

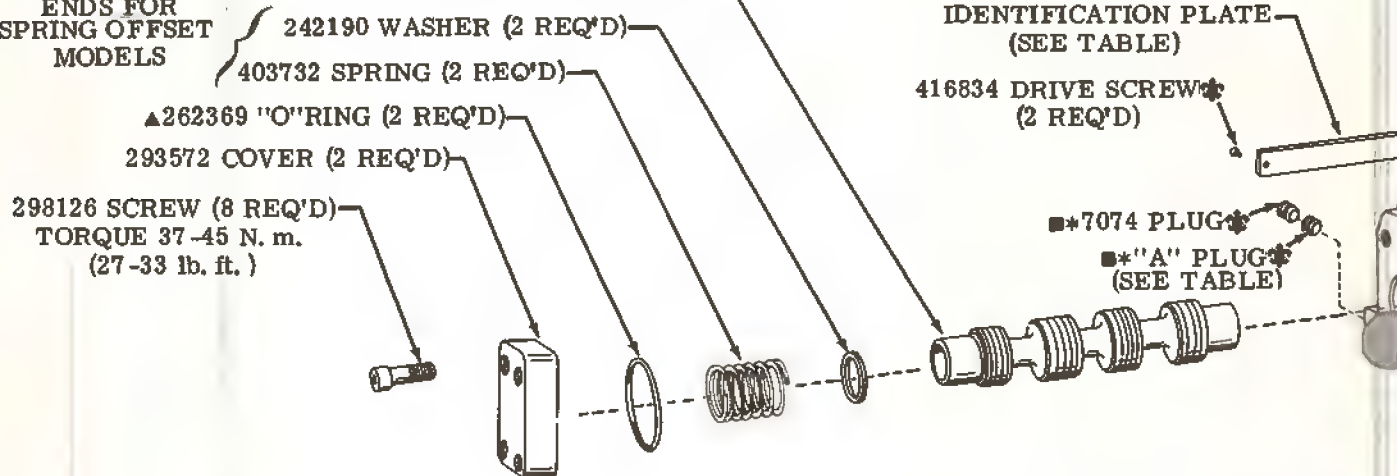
VALVE MODEL CODE	MAIN STAGE SPOOL TYPE	PILOT VALVE MODEL CODE	SERVICE DWG.
DG5S4-04*A-M-*-50	0, 1, 2, 3, 6, 9, 11, 31, 33	DG4V-3-2A-M-*-40	I-3861-S
	4 & 8	DG4V-3-28A-M-*-40	
DG5S4-04*B-M-*-50	0, 1, 2, 3, 6, 9, 11, 31, 33	DG4V-3-6B-M-*-40	I-3862-S
	4 & 8	DG4V-3-68B-M-*-40	
DG5S4-04*C-M-*-50	0, 1, 2, 3, 6, 9, 11, 31, 33	DG4V-3-6C-M-*-40	I-3863-S
	4 & 8	DG4V-3-68C-M-*-40	
DG5S4-04*N-M-*-50	0, 1, 2, 3, 6, 9, 11, 31, 33	DG4V-3-6N-M-*-40	I-3865-S
	4 & 8	DG4V-3-68N-M-*-40	

PILOT VALVE
(SEE TABLE)

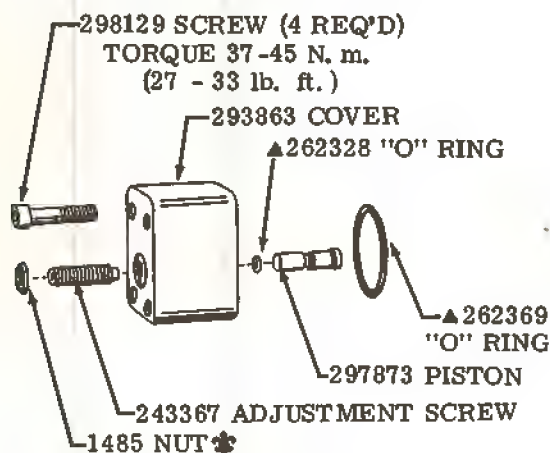
OMIT BOTH
ENDS FOR
SPRING OFFSET
MODELS

SPOOL (SEE TABLE)

IDENTIFICATION PLATE
(SEE TABLE)



PARTS SHOWN INCLUDED IN 941029
STROKE ADJUSTMENT KIT. ORDER
2 KITS IF STROKE ADJUSTMENT IS
REQUIRED FOR BOTH ENDS.



STROKE ADJUSTMENT PARTS
(EITHER END OR BOTH)

'B' PLUG ('P' POR
(SEE TABLE)

MODEL	SPRING
DG5S4-K	426859
DG5S4-R	418675
DG5S4-S	432350

418705 SLEEVE

418706 POPPET

418704 SEAT

262393 'O' RING

MODELS WITH CHECK
VALVE ONLY

VICKERS.

A TRIMONA COMPANY

Service Parts Information

Solenoid Controlled
Pilot Operated
Directional Valves

DG5S4-04-**-**-M-**-**-50



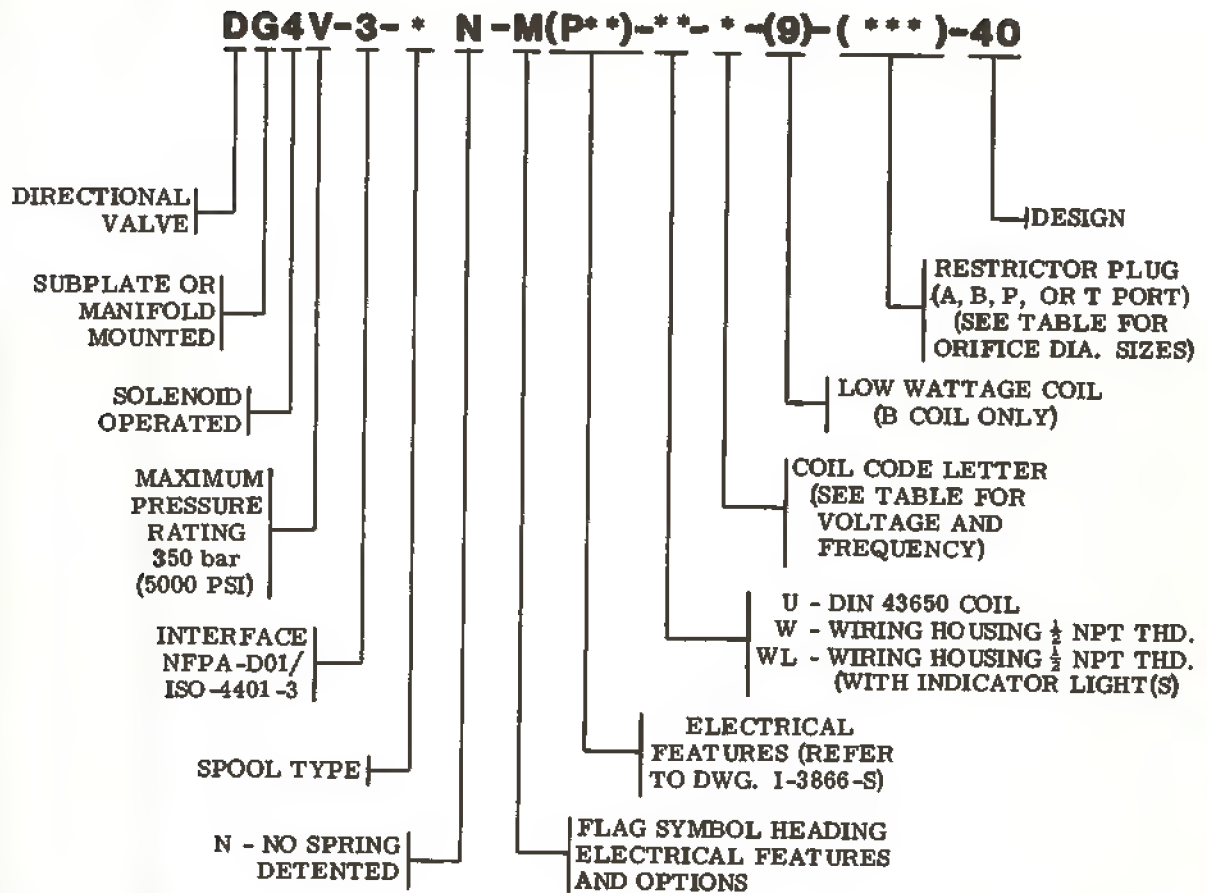
Vickers, Incorporated

1401 Crooks Road
Troy, Michigan 48064

Revised 12-1-87

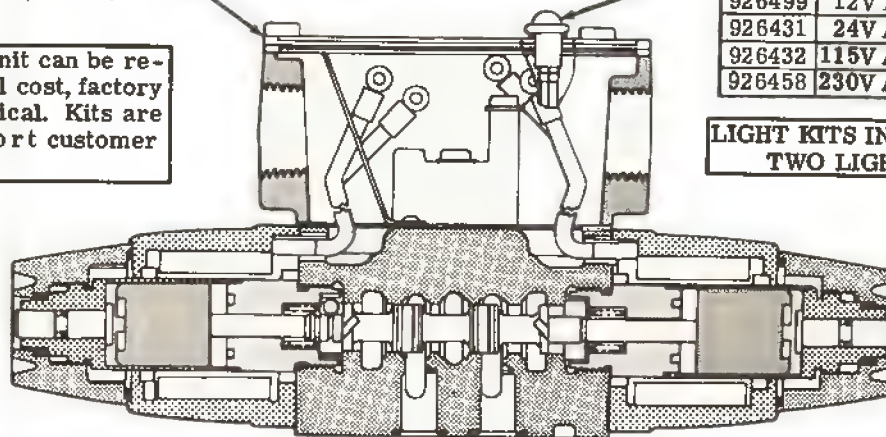
I-3867-S

MODEL CODE BREAKDOWN



635065 CARRIER (LIGHT)

As this complete unit can be replaced at a nominal cost, factory repair is not practical. Kits are available to support customer repair.



LIGHT KIT	VOLTAGE RANGE
926499	12V AC/DC
926431	24V AC/DC
926432	115V AC/DC
926458	230V AC/DC

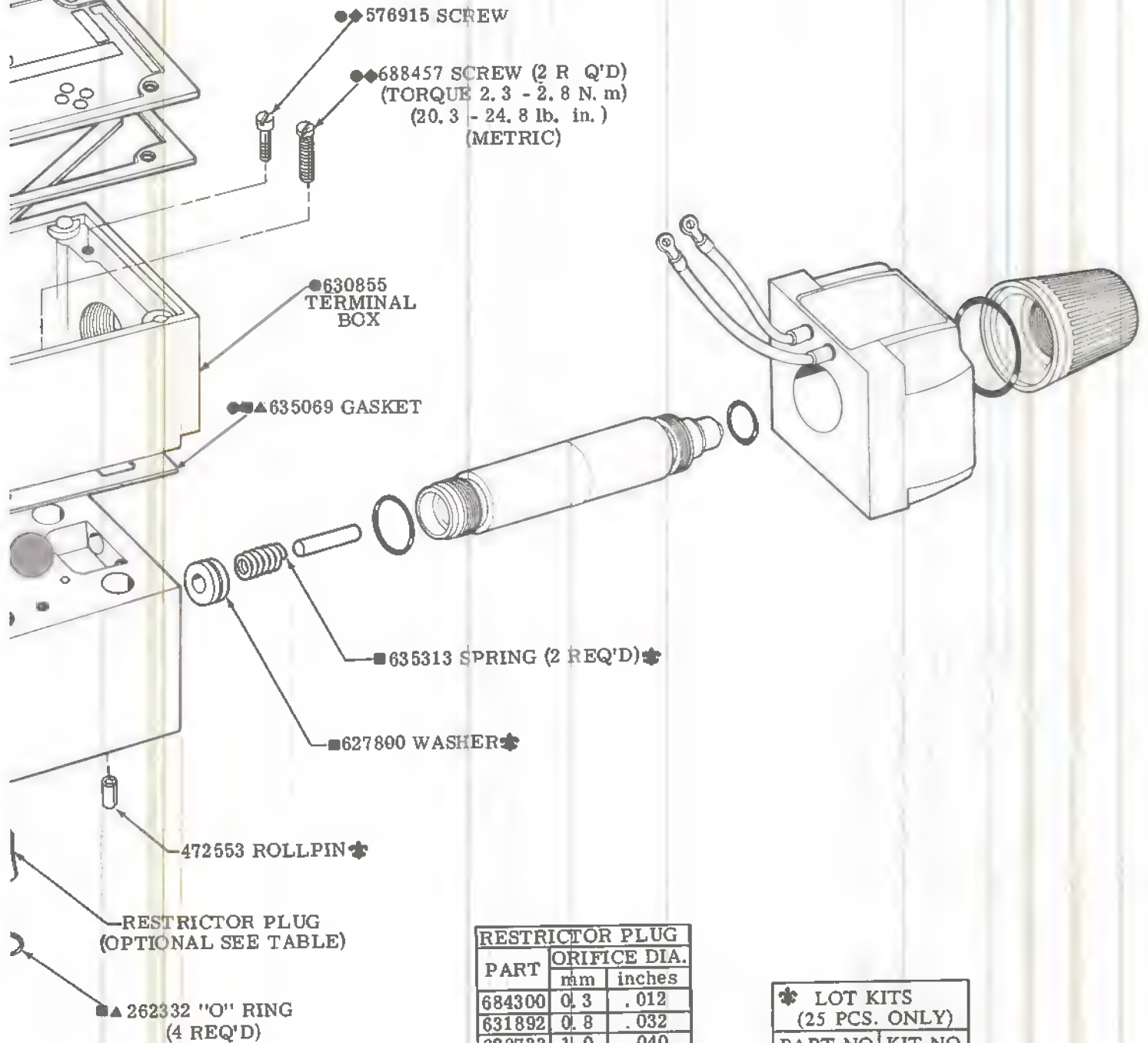
LIGHT KITS INCLUDE TWO LIGHTS

For satisfactory service life of these components in industrial applications, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from Vickers OFF, OFR, and OFRS series are recommended.

Litho in U. S. A.

SCREW (METRIC)	
◆◆ STD (4 REQ'D)	DIN 43650 (2 REQ'D)
◆ 422004	◆ 468641
TORQUE 0.5-0.7 N.m (4.5 - 6.2 lb. in.)	

989583 SEAL (REQ'D)
(NOT SHOWN) EN USING
468641 SCR FOR
DIN 43650 M DE S)



RESTRICTOR PLUG		
PART	ORIFICE DIA.	
	mm	inches
684300	0.3	.012
631892	0.8	.032
628733	1.0	.040
632937	1.3	.052
635281	1.5	.060
687072	2.0	.080
631931	2.3	.092
685482	3.2	.128
632936	BLANK	
USE IN EITHER		
A, B, P, OR T PORT		

* LOT KITS (25 PCS. ONLY)	
PART NO.	KIT NO.
422004	944066
468641	944012
635313	944006
627800	944001
472553	944008
453531	944002
635076	944003

DIN 43650 COIL S/A	COIL S/A	AC VOLT Hz	DC VOLT	COIL CODE
635061	633741	110/50, 115/60, 120/60		B
683312	989721	110/50, 115/60, 120/60		*B-9
635062	633742	220/50, 230/60, 240/60	—	D
683218	989764	24/50, 24/60		N
683310	683053	100/50, 100/60		T
681611	681404		32	DK
681423	989654		12	G
681610	989656		24	H
682552	682550		48	J

*B-9 REDUCED POWER CONSUMPTION COIL

SPOOL TYPE	SPOOL	■ SPOOL KIT
0N	989598	926375
2N	635340	926376
6N/68N	989599	926377

SPOOL KIT ALSO IN-
CLUDES PARTS PRE-
FIXED WITH ▲ AND ■.

PARTS PREFIXED WITH SYMBOL
AVAILABLE ONLY IN KITS

◆ INCLUDED IN 926433
FASTENER KIT

A SPOOL DESIGNATION CF 68N INDICATES VALVE IS
USED AS A PILOT FOR TWO STAGE VALVES WITH A
4 OR 8 TYPE MAIN STAGE SPOOL. REFER TO DWGS.
J-682451 CR J-685777 FOR CORRECT NAMEPLATE.

NAMEPLATE LABEL
(STD MODEL REFER TO DWG. J-682451)
(DIN 43650 REFER TO DWG. J-685777)

635067 CARRIER (STD MODEL)
989585 CARRIER (DIN 43650)

●■▲ 633746 GASKET/
RETAINER

●◆ 36212 SCREW

▲ INCLUDED IN F3
SEAL KIT 920304

● OMIT WHEN USING
MODELS WITH DIN
43650 COILS.

REFER TO DWG. I-3866-S
FOR ELECTRICAL
FEATURES AND OPTIONS

DIN 43650 COIL MATING
RECEPTACLES (NOT SHOWN)
710776 'A' SOLENOID (GRAY)
710775 'B' SOLENOID (BLACK)

DIN 43650 COIL S/A
(2 REQ'D) (SEE TABLE)
(INCLUDES LABEL)

631604 BODY
(NOT AVAILABLE
FOR SALE)

■ SPOOL (SEE TABLE)

926397 DETENT KIT

453531 'AC' PUSH PIN (2 REQ'D)
635076 'DC' PUSH PIN (2 REQ'D)

■▲ 262336 "O" RING (2 REQ'D)

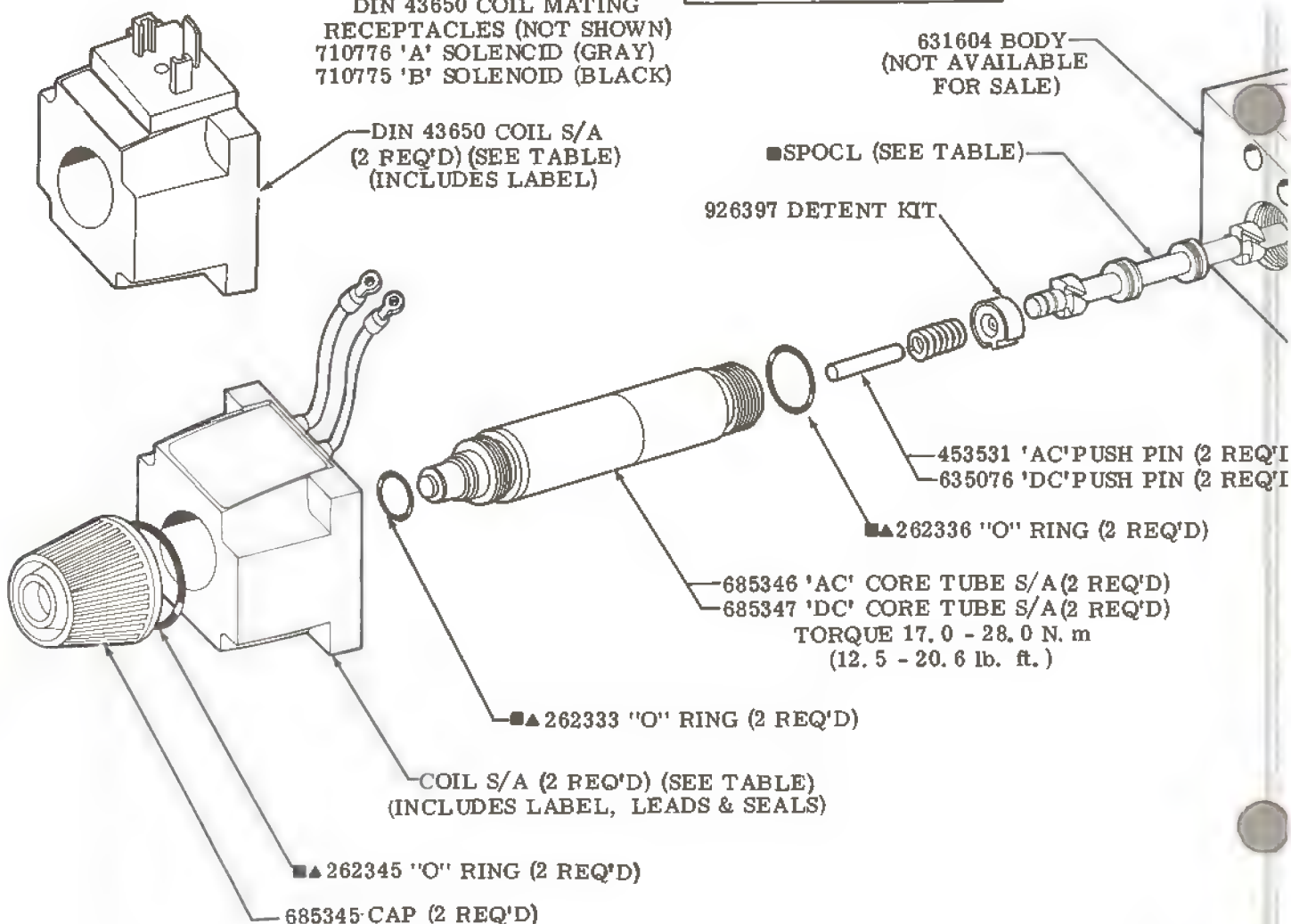
685346 'AC' CORE TUBE S/A (2 REQ'D)
685347 'DC' CORE TUBE S/A (2 REQ'D)
TORQUE 17.0 - 28.0 N.m
(12.5 - 20.6 lb. ft.)

■▲ 262333 "O" RING (2 REQ'D)

COIL S/A (2 REQ'D) (SEE TABLE)
(INCLUDES LABEL, LEADS & SEALS)

■▲ 262345 "O" RING (2 REQ'D)

685345-CAP (2 REQ'D)



Service Parts Information

**Solenoid
Operated
Directional
Valve**

DG4V-3-*N-M(P**)-**-*-40 Detented



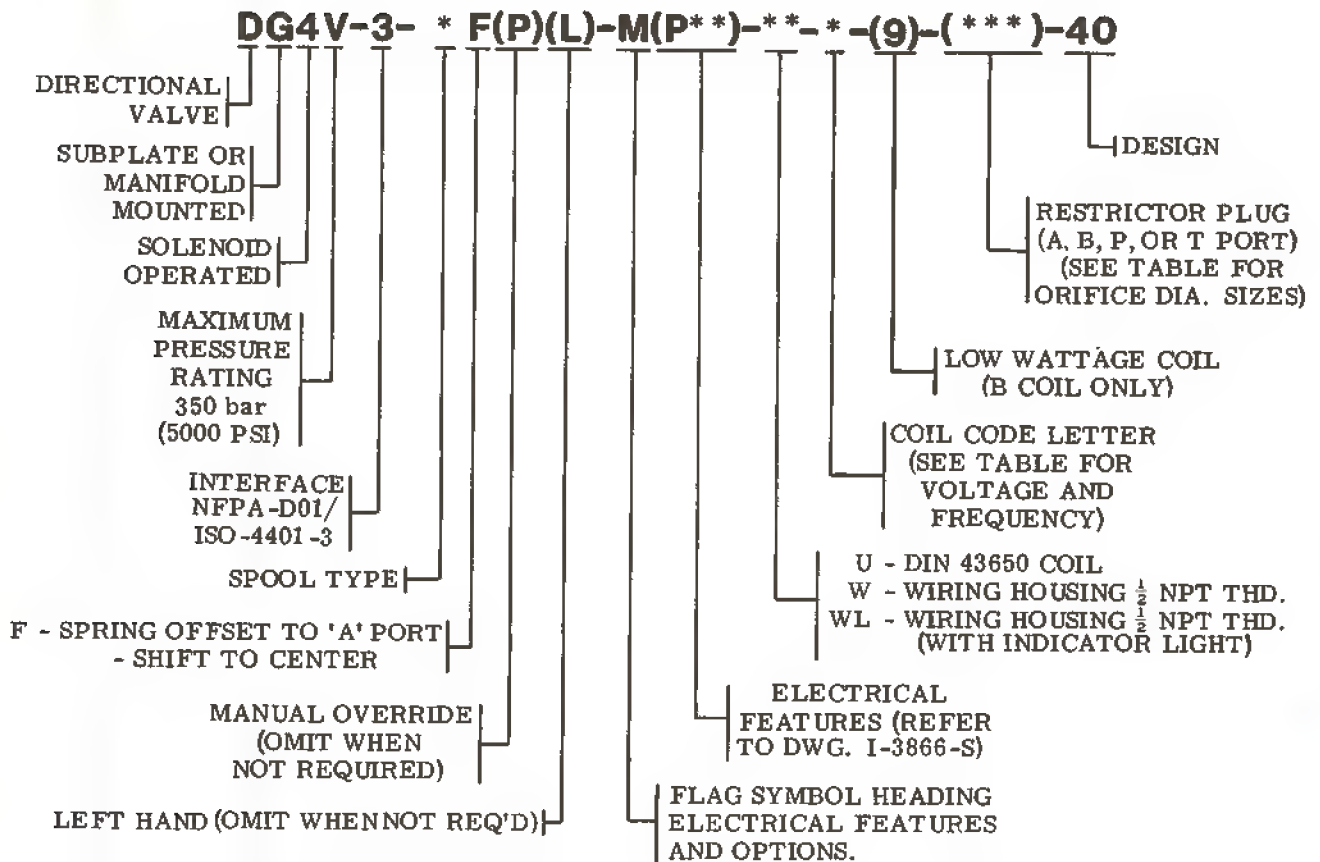
Vickers, Incorporated

P.O. Box 302
Troy, Michigan 48007-0302

Revised 5-1-87

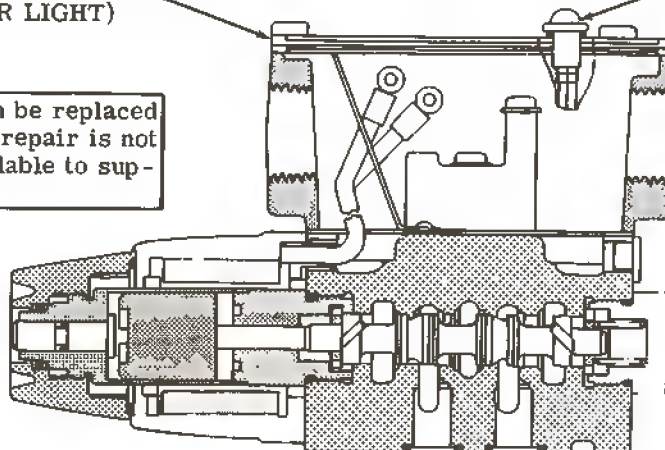
I-3865-S

MODEL CODE BREAKDOWN



As this complete unit can be replaced at a nominal cost, factory repair is not practical. Kits are available to support customer repair.

635065 CARRIER (FOR LIGHT)



LIGHT KIT	VOLTAGE RANGE
926499	12V AC/DC
926431	24V AC/DC
926432	115V AC/DC
926458	230V AC/DC

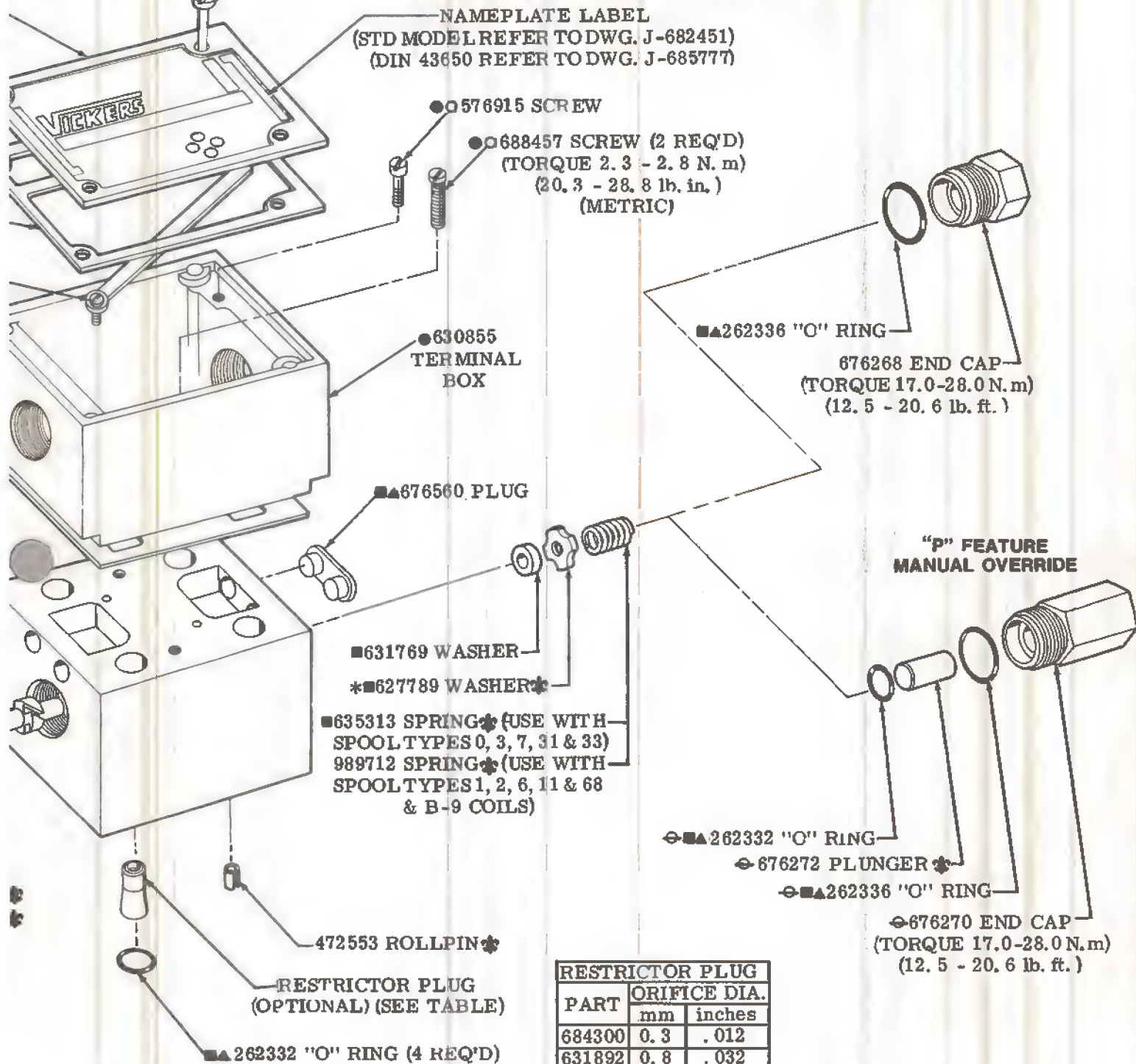
LIGHT KITS INCLUDE TWO LIGHTS

For satisfactory service life of these components in industrial applications, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from Vickers OFP, OFR, and OFRS series are recommended.

DG4V-3-*F-M(P**)-***-40

SCREW (METRIC)	
● STD (4 REQ'D)	DIN 43650 (2 REQ'D)
422004	468641
TORQUE 0.5-0.7 N.m (4.5 - 6.2 lb. in.)	

989583 SEAL (2 REQ'D)
(NOT SHOWN)(WHEN USING
468641 SCREW FOR
DIN 43650 MODELS)



- ▲ INCLUDED IN SEAL KIT 920304
- INCLUDED IN FASTENER KIT 926433
- INCLUDED IN MANUAL OVERRIDE KIT 926463
- ✱ AVAILABLE ONLY IN KITS OF 25
- ◆ NOT AVAILABLE FOR SALE
- OMIT WHEN USING DIN 43650 COILS
- INCLUDED IN SPOOL KIT (SEE TABLE)

RESTRICTOR PLUG		
PART	ORIFICE DIA.	
	mm	inches
684300	0.3	.012
631892	0.8	.032
628733	1.0	.040
632937	1.3	.052
635281	1.5	.060
687072	2.0	.080
631931	2.3	.092
685482	3.2	.128
632936	BLANK	
USE IN EITHER A, B, P, OR T PORT		

RIGHT HAND ASSEMBLY SHOWN,
EXCEPT 6F & 68F. FOR LEFT
HAND ASSEMBLY, ALL PARTS
ARE REVERSED, EXCEPT BODY,
SPOOL, AND TERMINAL BOX.

DIN 43650 COILS/A	COIL S/A	AC VOLT Hz	DC VOLT	COIL CODE	SPOOL TYPE	SPOOL	■ SPOOL KIT
635061	633741	110/50, 115/60, 120/60	—	B	0F	635338	926369
683312	989721	110/50, 115/60, 120/60		*B-9	1/11F	683314	926446
635062	633742	220/50, 230/60, 240/60		D	2F	631611	926370
683218	989764	24/50, 24/60		N	3/31F	989593	926371
683310	683053	100/50, 100/60		T	6/68F	631603	926372
681611	681404	—	32	DK	7F	989592	926373
681423	989654		12	G	33F	635339	926374
681610	989656		24	H	SPOOL KIT ALSO IN- CLUDES PARTS PRE- FIXED WITH ■ AND ▲.		
682552	682550		48	J			
*B-9 REDUCED POWER CONSUMPTION COIL							

635067 CARRIER (STD 1
989585 CARRIER (DIN 4

-ASSEMBLE TYPE 1 AND 3 SPOOLS WITH NARROW CENTER LAND TOWARDS 'A' PORT. THE TYPES 11 AND 31 SPOOLS ARE 1 AND 3 SPOOLS REVERSED WITH NARROW CENTER LAND TOWARDS 'B' PORT.

-A SPOOL DESIGNATION OF 68 INDICATES VALVE IS USED AS A PILOT FOR TWO STAGE VALVES WITH 4 OR 8 TYPE MAIN STAGE SPOOLS. 68 IS USED WITH SPRING OFFSET, SHIFT TO CENTER UNITS. REFER TO DWGS. J-682451 & J-685777 FOR CORRECT NAMEPLATE LABEL.

REFER TO I-3866-S FOR ELECTRICAL
FEATURES AND OPTIONS

PARTS PREFIXED WITH SYMBOLS
AVAILABLE ONLY IN KITS

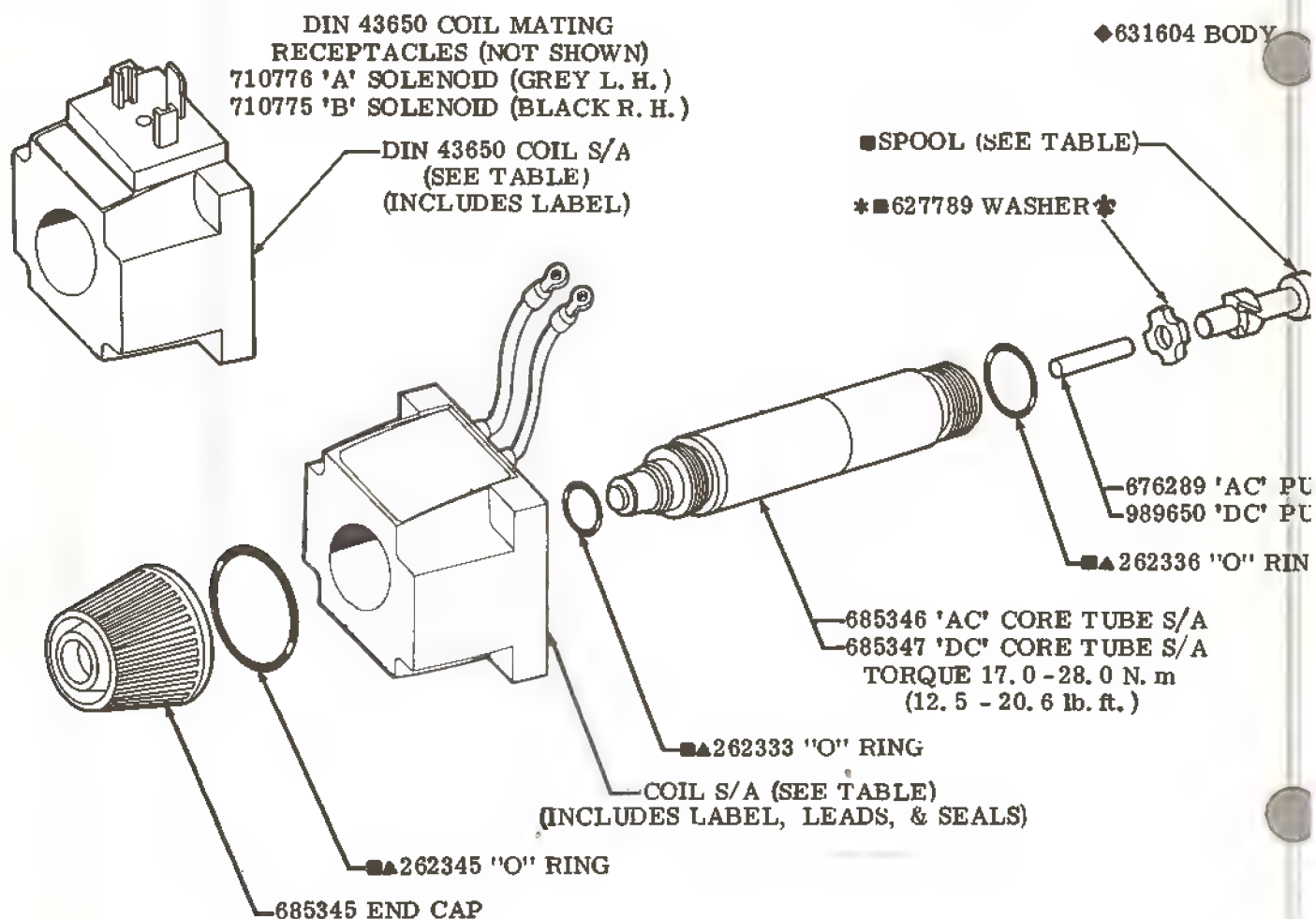
*ASSEMBLE ROUNDED FACE OF
WASHER TO MATE WITH SPOOL

■▲ 633746 GASKET/
RETAINER

●○ 36212 SCREW.

●■▲ 635069 GASKET

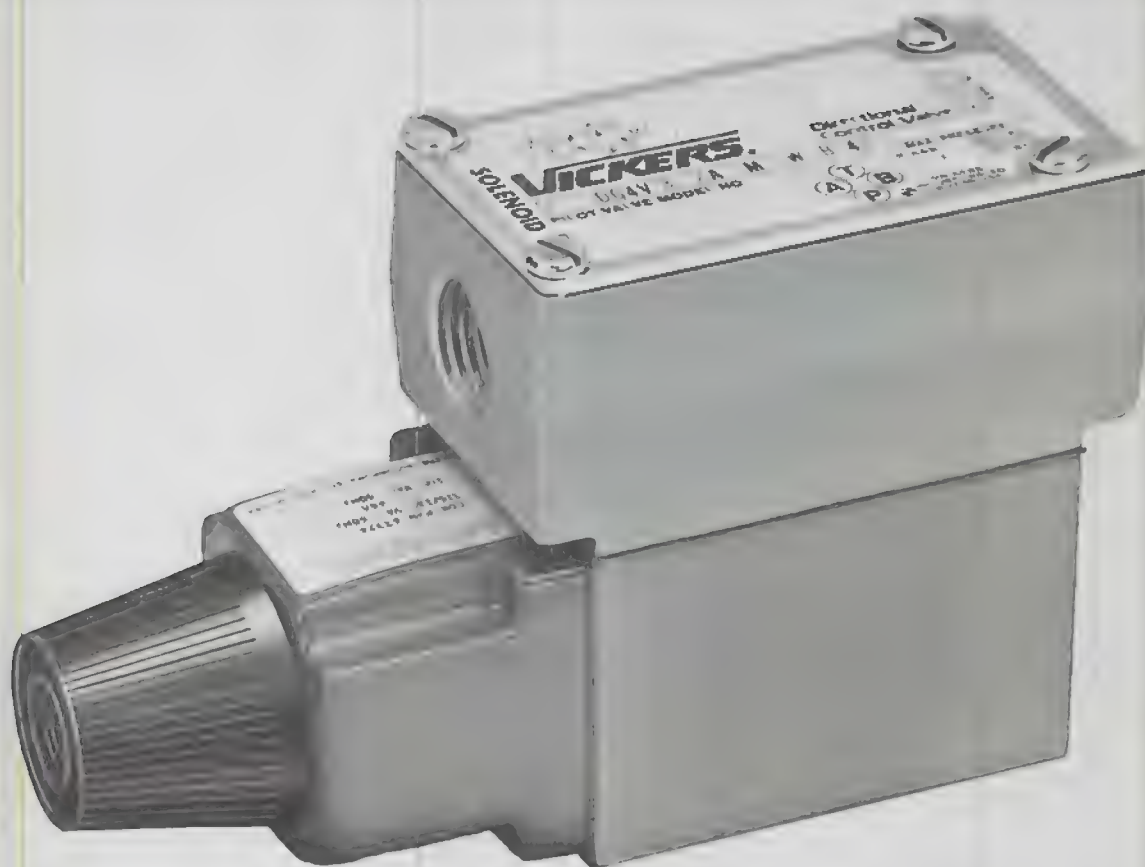
◆ 631604 BODY



Service Parts Information

**Solenoid
Operated
Directional
Valve**

DG4V-3-*F-M(P**)-**-*-40 Spring Offset



Vickers, Incorporated

P.O. Box 302
Troy, Michigan 48007-0302

Revised 7-1-86

I-3864-S

MODEL CODE BREAKDOWN

DG4V-3- * B(P)(L)-M(P **)--*(9)-(***)-40**

DIRECTIONAL
VALVE

SUBPLATE OR
MANIFOLD
MOUNTED

SOLENOID
OPERATED

MAXIMUM
PRESSURE
RATING
350 bar
(5000 PSI)

INTERFACE
NFPA-D01/
ISC-4401-3

SPOOL TYPE

B - SPRING CENTERED
SOLENOID A REMOVED

MANUAL OVERRIDE
(OMIT WHEN
NOT REQUIRED)

LEFT HAND
(OMIT WHEN
NOT REQUIRED)

DESIGN

RESTRICTOR PLUG
(A, B, P, OR T PORT)
(SEE TABLE FOR
ORIFICE DIA. SIZES)

LOW WATTAGE COIL
(B COIL ONLY)

COIL CODE LETTER
(SEE TABLE FOR
VOLTAGE AND
FREQUENCY)

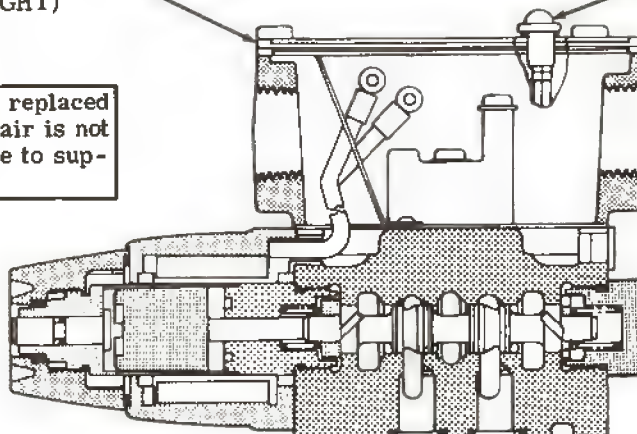
U - DIN 43650 COIL
W - WIRING HOUSING $\frac{1}{2}$ NPT. THD.
WL - WIRING HOUSING $\frac{1}{2}$ NPT. THD.
(WITH INDICATOR LIGHT)

ELECTRICAL
FEATURES (REFER
TO DWG. 1-3866-S)

FLAG SYMBOL HEADING
ELECTRICAL FEATURES
AND OPTIONS.

635065 CARRIER
(LIGHT)

As this complete unit can be replaced
at a nominal cost, factory repair is not
practical. Kits are available to sup-
port customer repair.



LIGHT KIT	VOLTAGE RANGE
926499	12V AC/DC
926431	24V AC/DC
926432	115V AC/DC
926458	230V AC/DC

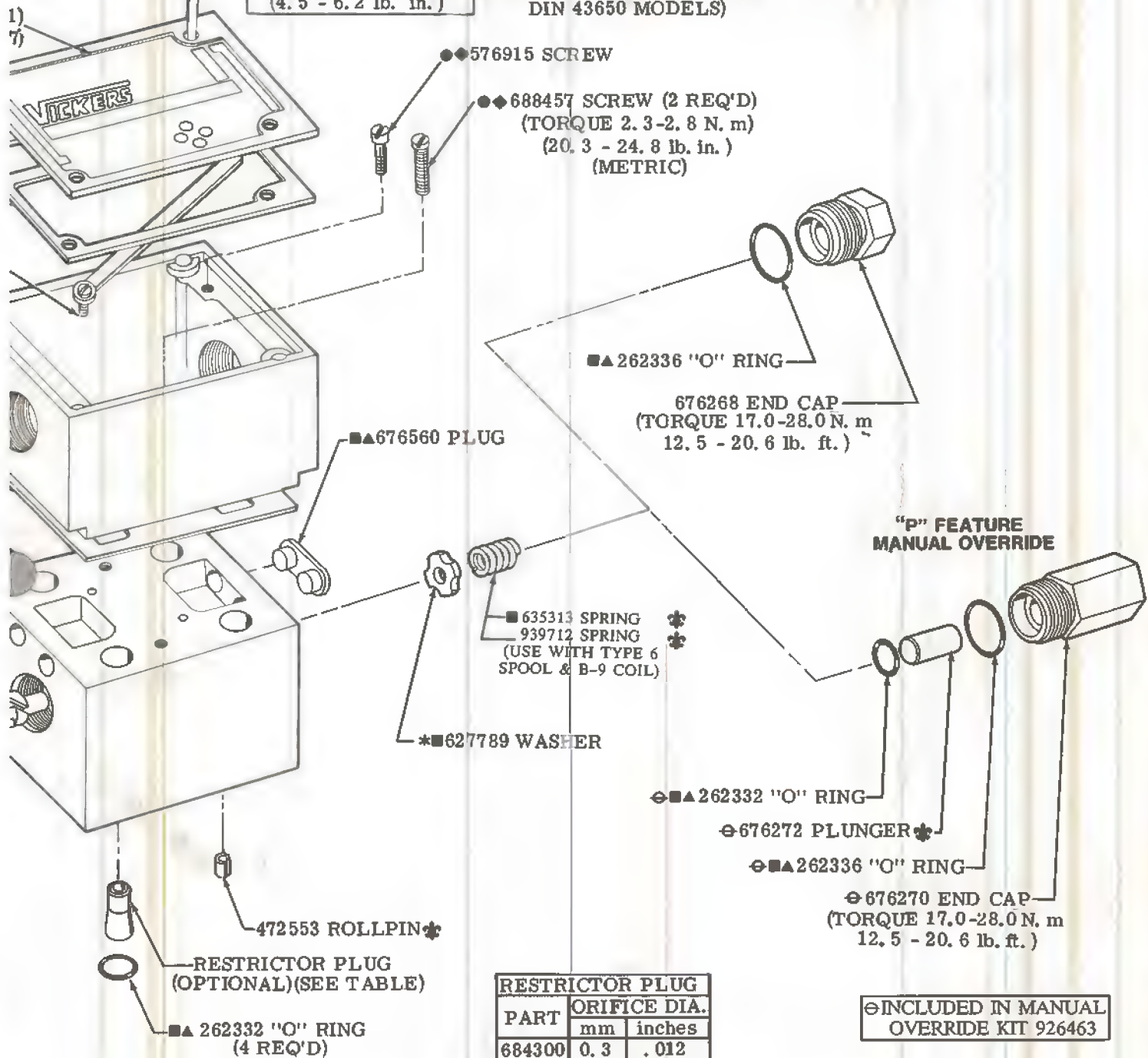
LIGHT KITS INCLUDE
TWO LIGHTS

For satisfactory service life of these components in industrial applications, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from Vickers OFF, OFR, and OFRS series are recommended.

Litho in U. S. A.

SCREW (METRIC)	
◆◆ STD (4 REQ'D)	DIN 43650 (2 REQ'D)
422004	468641
TORQUE 0.5-0.7 N. m (4.5 - 6.2 lb. in.)	

989583 SEAL (2 REQ'D)
(NOT SHOWN)(WHEN USING
468641 SCREW FOR
DIN 43650 MODELS)



RIGHT HAND ASSEMBLY
SHOWN, EXCEPT 8B(P) AND 68B(P).
FOR LEFT HAND ASSEMBLY. ALL
PARTS ARE REVERSED EXCEPT
BODY, SPOOL, AND TERMINAL BOX

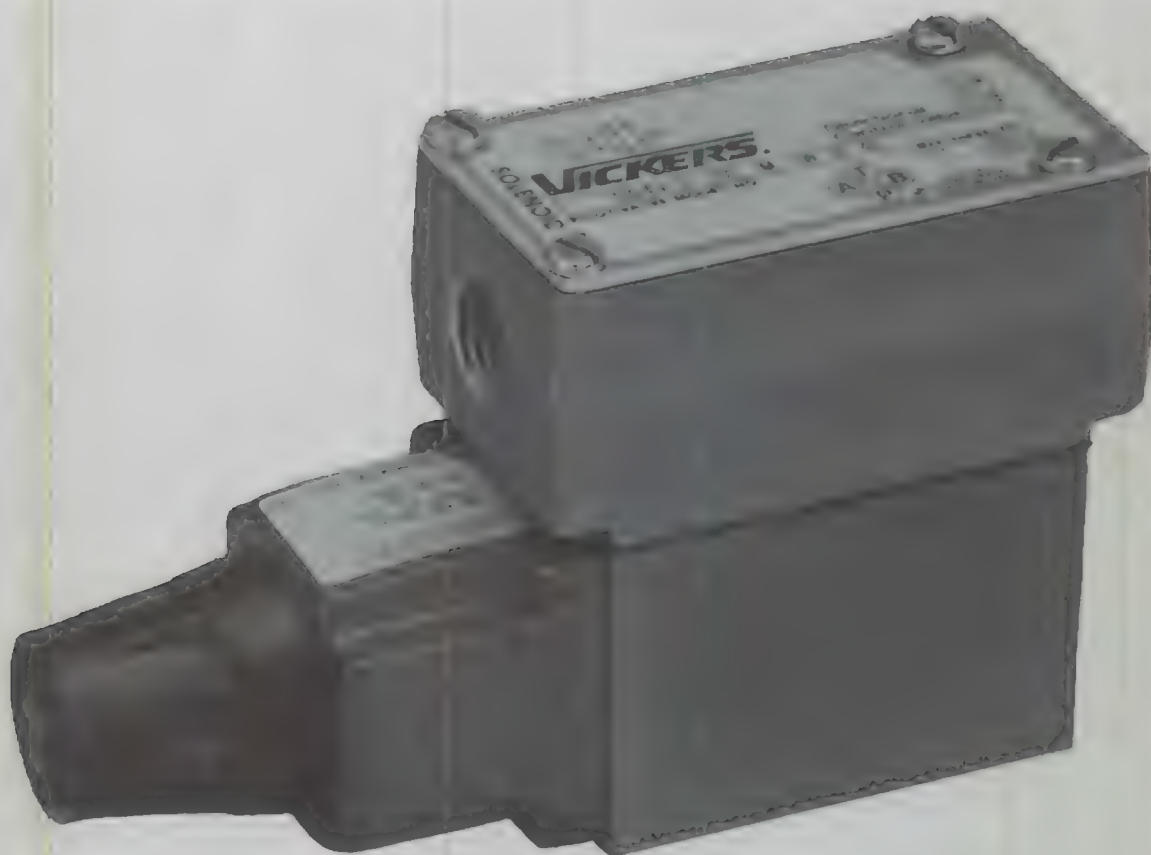
VICKERS®

A TRINITY COMPANY

Service Parts Information

**Solenoid
Operated
Directional
Valve**

DG4V-3-*B-M(P**)-**-*-40 Spring Centered



Vickers, Incorporated

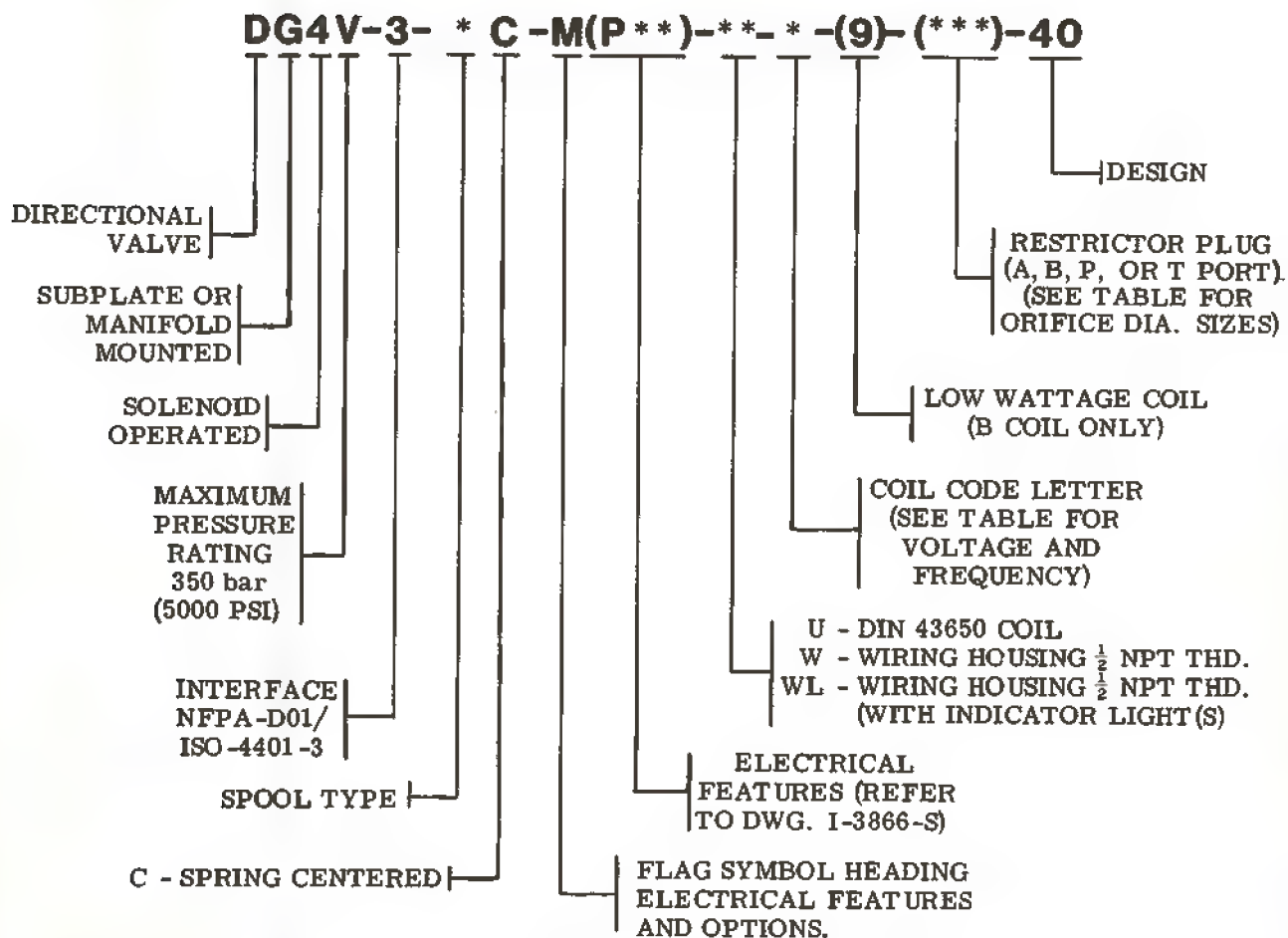
1401 Crooks Road
Troy, Michigan 48064

Revised 12-1-87

I-3862-S

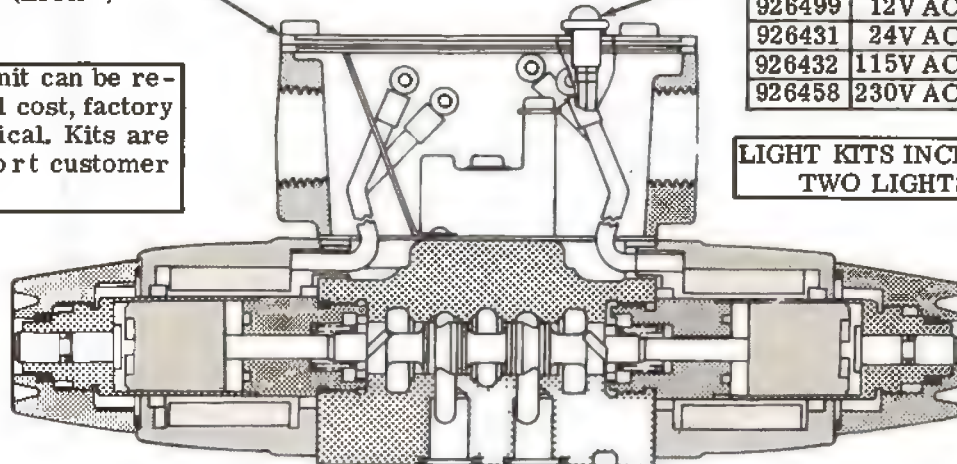
122

MODEL CODE BREAKDOWN



635065 CARRIER (LIGHT)

As this complete unit can be replaced at a nominal cost, factory repair is not practical. Kits are available to support customer repair.



LIGHT KIT	VOLTAGE RANGE
926499	12V AC/DC
926431	24V AC/DC
926432	115V AC/DC
926458	230V AC/DC

LIGHT KITS INCLUDE TWO LIGHTS

For satisfactory service life of these components in industrial applications, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from Vickers OFP, OFR, and OFRS series are recommended.

Litho in U. S. A.

SCREW (METRIC)	
◆◆STD (4 REQ'D)	DIN 43650 (2 REQ'D)
422004	468641
TORQUE 0.5-0.7 N.m (4.5 - 6.2 lb. in.)	

989583 SEAL (2 REQ'D)
(NOT SHOWN)(WHEN USING
468641 SCREW FOR
DIN 43650 MODELS)

635067 CARRIER(STD MODELS)
989585 CARRIER(DIN 43650)

NAMEPLATE LABEL
(STD MDEL REFER TO DWG.J-682451)
(DIN 43650 REFER TO DWG.J-685777)

◆◆▲633746 GASKET/
RETAINER

◆◆688457 SCREW (2 REQ'D)
(TORQUE 2.3 - 2.8 N.m)
(20.3 - 24.8 lb. in.)
(METRIC)

◆◆576915 SCREW

◆▲262336 "O" RING (2 REQ'D)

453531 'AC' PUSH PIN (2 REQ'D)✱

684002 'AC' PUSH PIN (2 REQ'D)✱
(TYPE 8 SPOOL ONLY)

635076 'DC' PUSH PIN (2 REQ'D)✱

◆ * 627789 WASHER (2 REQ'D)✱

◆ * 573643 WASHER (2 REQ'D)✱
(USE WITH TYPE 2 SPOOL
AND B-9 COIL ONLY)

472553 ROLL PIN✱

RESTRICTOR PLUG
(OPTIONAL)(SEE TABLE)

◆▲262332 "O" RING
(4 REQ'D)

RESTRICTOR PLUG		
PART	ORIFICE DIA.	
	mm	inches
684300	0.3	.012
631892	0.8	.032
628733	1.0	.040
632937	1.3	.052
635281	1.5	.060
687072	2.0	.080
631931	2.3	.092
685482	3.2	.128
632936	BLANK	
USE IN EITHER A, B, P, OR T PORT		

DIN 43650 COILS/A	COIL S/A	AC VOLT Hz	DC VOLT	COIL CODE
635061	633741	110/50, 115/60, 120/60		B
683312	989721	110/50, 115/60, 120/60		*B-9
635062	633742	220/50, 230/60, 240/60		D
683218	989764	24/50, 24/60		N
683310	683053	100/50, 100/60		T
681611	681404		32	DK
681423	989654		12	G
681610	989656		24	H
682552	682550		48	J

*B-9 REDUCED POWER CONSUMPTION COIL

SPOOL TYPE	SPOOL	■ SPOOL KIT
0C	635338	926362
1/11C	683314	926446
2C	631811	926363
3/31C	989593	926364
6/68C	631603	926365
7/78C	989592	926366
8C-S288	630305	926367
33C	635339	926368

SPOOL KIT ALSO INCLUDES PARTS PREFIXED WITH ▲ AND ■.

*ASSEMBLE ROUNDED FACE OF WASHER TO MATE WITH SPOOL

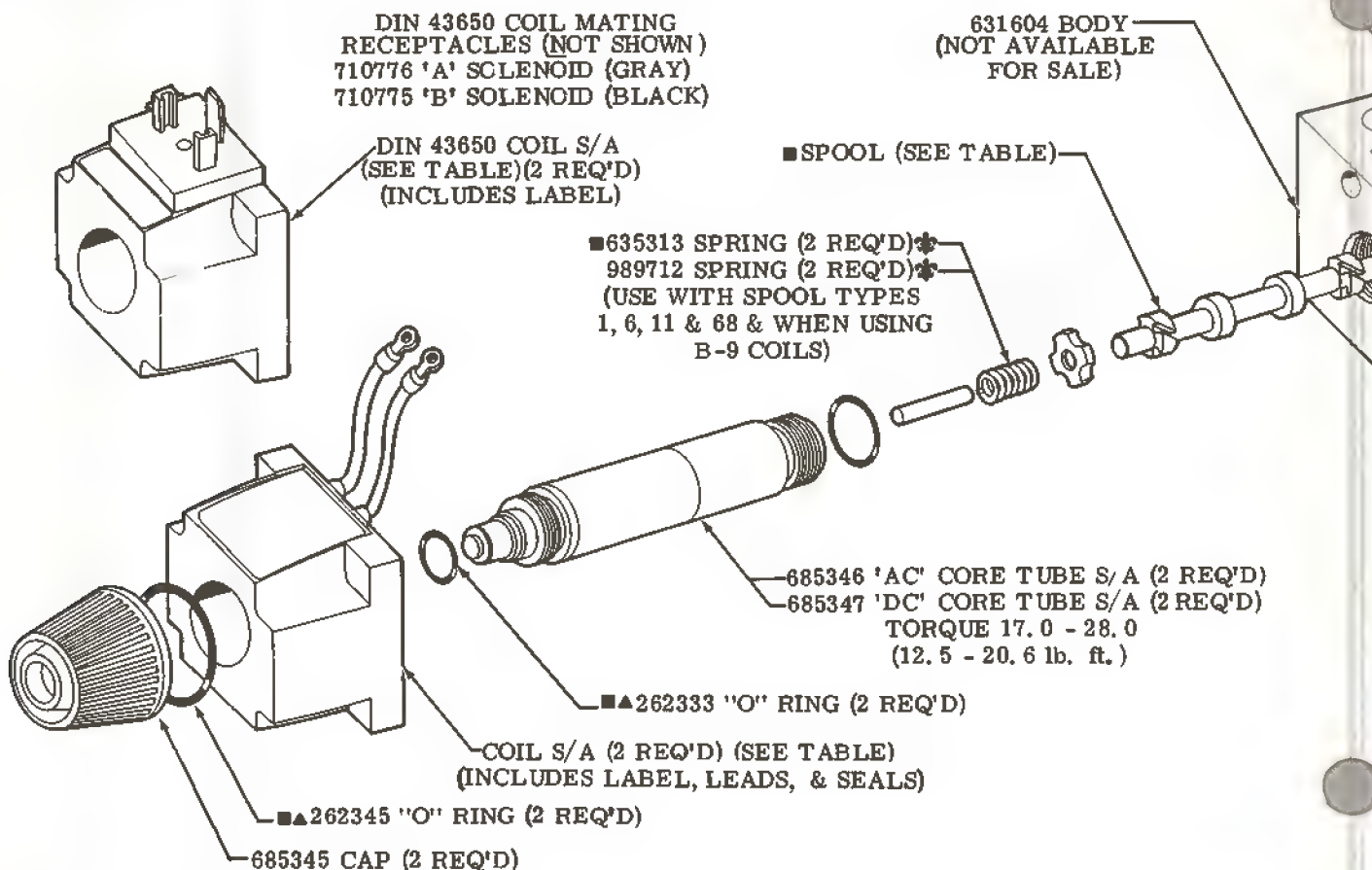
PARTS PREFIXED WITH SYMBOLS AVAILABLE ONLY IN KITS

REFER TO DWG. I-3866-S FOR ELECTRICAL FEATURES AND OPTIONS

-ASSEMBLE TYPE 1 AND 3 SPOOLS WITH NARROW CENTER LAND TOWARDS 'A' PORT. THE TYPES 11 AND 31 SPOOLS ARE 1 AND 3 SPOOLS REVERSED WITH NARROW CENTER LAND TOWARDS 'B' PORT.

-A SPOOL DESIGNATION OF 68C/78C INDICATES VALVE IS USED AS A PILOT FOR TWO STAGE VALVES WITH 4 OR 8 TYPE MAIN STAGE SPOOLS. 68C IS USED WITH SPRING CENTERED UNITS. 78C IS USED WITH PRESSURE CENTERED UNITS. REFER TO DWG. J-682451 AND J-685777 FOR CORRECT NAMEPLATE LABEL.

- ▲ INCLUDED IN F3 SEAL KIT 920304
- ◆ INCLUDED IN FASTENER KIT 926433
- * AVAILABLE ONLY IN KITS OF 25
- OMIT WHEN USING DIN 43650 COILS

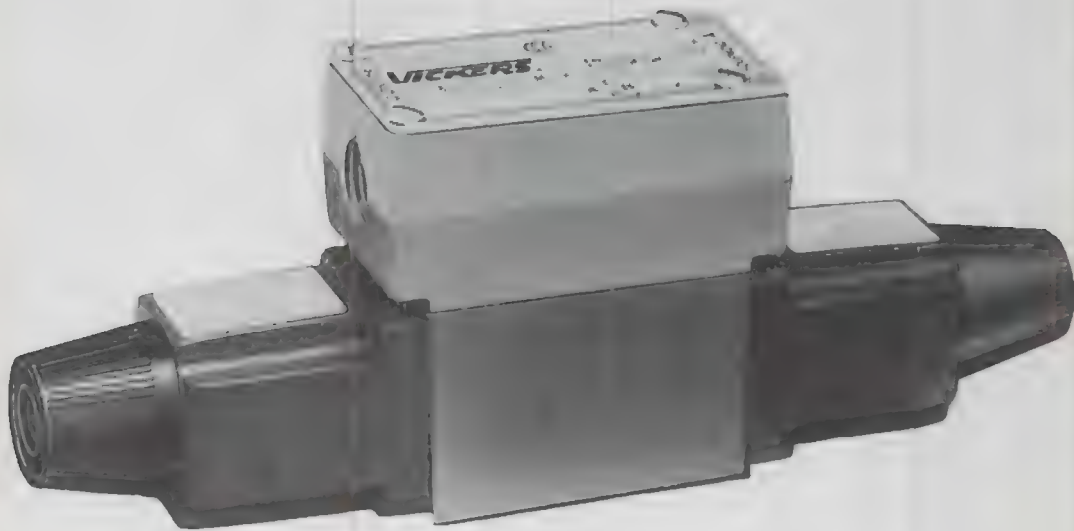


2100

Service Parts Information

**Solenoid
Operated
Directional
Valve**

DG4V-3-*C-M(P**)-**-*-40 · Spring Centered



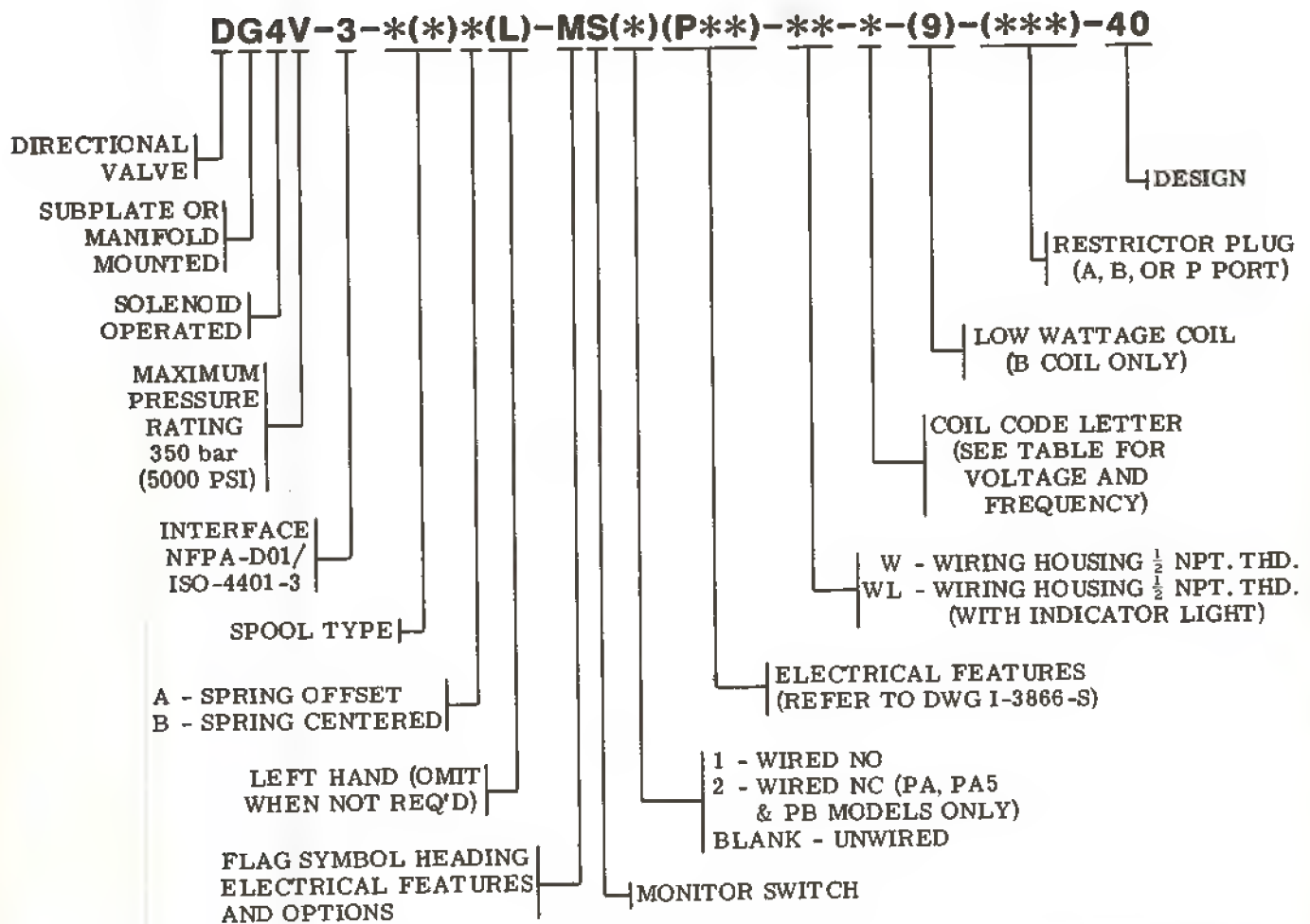
Vickers, Incorporated

P.O. Box 302
Troy, Michigan 48007-0302

Revised 8-1-86

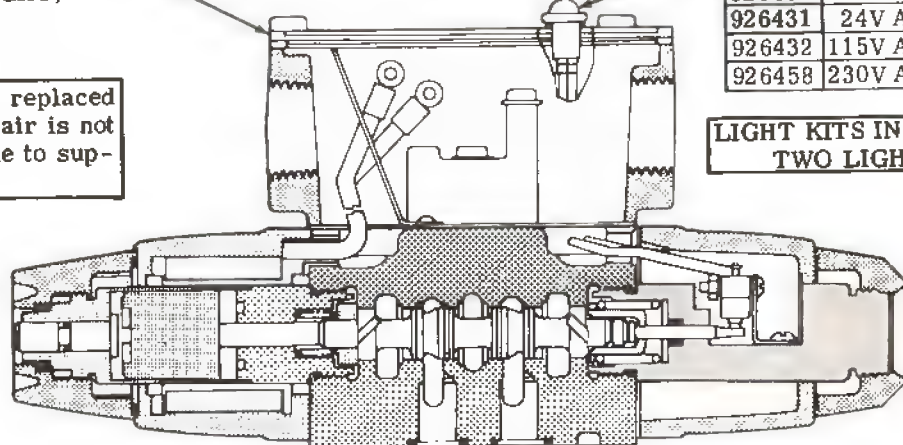
I-3863-S

MODEL CODE BREAKDOWN



635065 CARRIER (LIGHT)

As this complete unit can be replaced at a nominal cost, factory repair is not practical. Kits are available to support customer repair.




LIGHT KIT	VOLTAGE RANGE
926499	12V AC/DC
926431	24V AC/DC
926432	115V AC/DC
926458	230V AC/DC

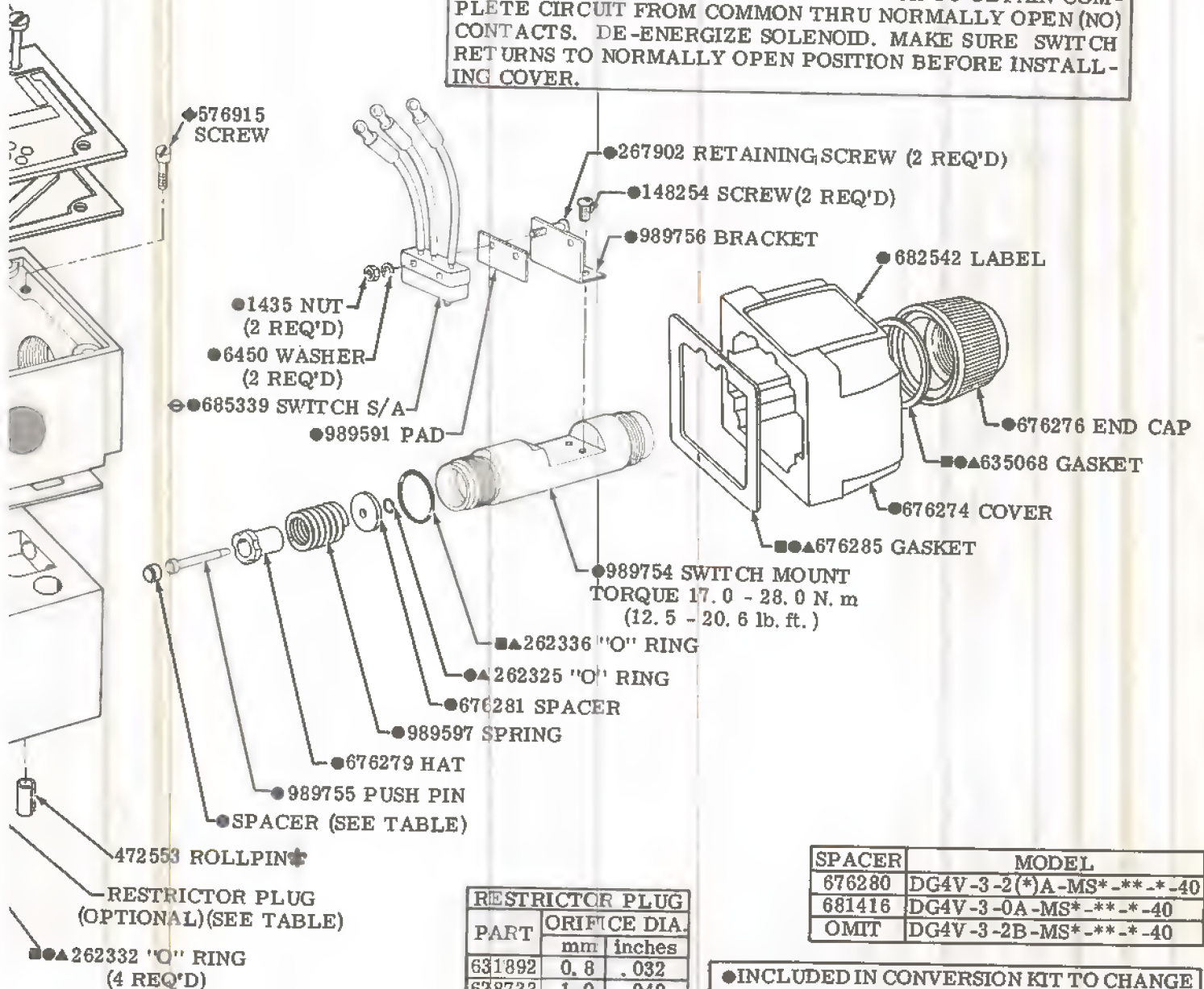
LIGHT KITS INCLUDE TWO LIGHTS

For satisfactory service life of these components in industrial applications, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from Vickers OFP, OFR, and OFRS series are recommended.

Litho in U. S. A.

MONITOR SWITCH CHARACTERISTICS		
WIRE SLEEVING COLOR CODE		NC
BLACK SLEEVING - C		
NO SLEEVING - NO		
WHITE SLEEVING - NC		

MONITOR SWITCH ADJUSTMENT PROCEDURE
 REMOVE COVER AND ENERGIZE SOLENOID. LOOSEN SWITCH RETAINING SCREWS AND POSITION SWITCH TO OBTAIN COMPLETE CIRCUIT FROM COMMON THRU NORMALLY OPEN (NO) CONTACTS. DE-ENERGIZE SOLENOID. MAKE SURE SWITCH RETURNS TO NORMALLY OPEN POSITION BEFORE INSTALLING COVER.



RESTRICTOR PLUG		
PART	ORIFICE DIA	
	mm	inches
631892	0.8	.032
628733	1.0	.040
632937	1.3	.052
635281	1.5	.060
631931	2.3	.092
632936	BLANK	
USE IN EITHER A, B, OR P PORT		

SPACER	MODEL
676280	DG4V-3-2(*)A-MS*-**-*-40
681416	DG4V-3-0A-MS*-**-*-40
OMIT	DG4V-3-2B-MS*-**-*-40

● INCLUDED IN CONVERSION KIT TO CHANGE FROM STD. DG4V-3-**-M-**-*-40 TO MONITOR SWITCH FEATURE. KITS AVAILABLE ONLY FOR SPOOL TYPES LISTED BELOW:

● KIT	MODEL
926506	DG4V-3-0A-MS*-**-*-40
926507	DG4V-3-2(*)A-MS*-**-*-40
926508	DG4V-3-2B-MS*-**-*-40

COIL S/A	AC VOLT Hz	DC VOLT	COIL CODE
633741	110/50, 115/60, 120/60	—	B
989721	110/50, 115/60, 120/60		*B-9
633742	220/50, 230/60, 240/60		D
989764	24/50, 24/60		N
683053	100/50, 100/60		T
681404	—	32	DK
989654		12	G
989656		24	H
682550		48	J

*B-9 REDUCED POWER CONSUMPTION COIL

SPOOL TYPE	SPOOL	SPOOL KIT
0A	989594	926509
2/28A	631615	926510
22A	989649	926511
2B	631611	926512

SPOOL KIT ALSO INCLUDES PARTS PRE-FIXED WITH ■ AND ▲.

▲ INCLUDED IN F3 SEAL KIT 920334

REFER TO DWG. I-3866-S
FOR ELECTRICAL
FEATURES & OPTIONS

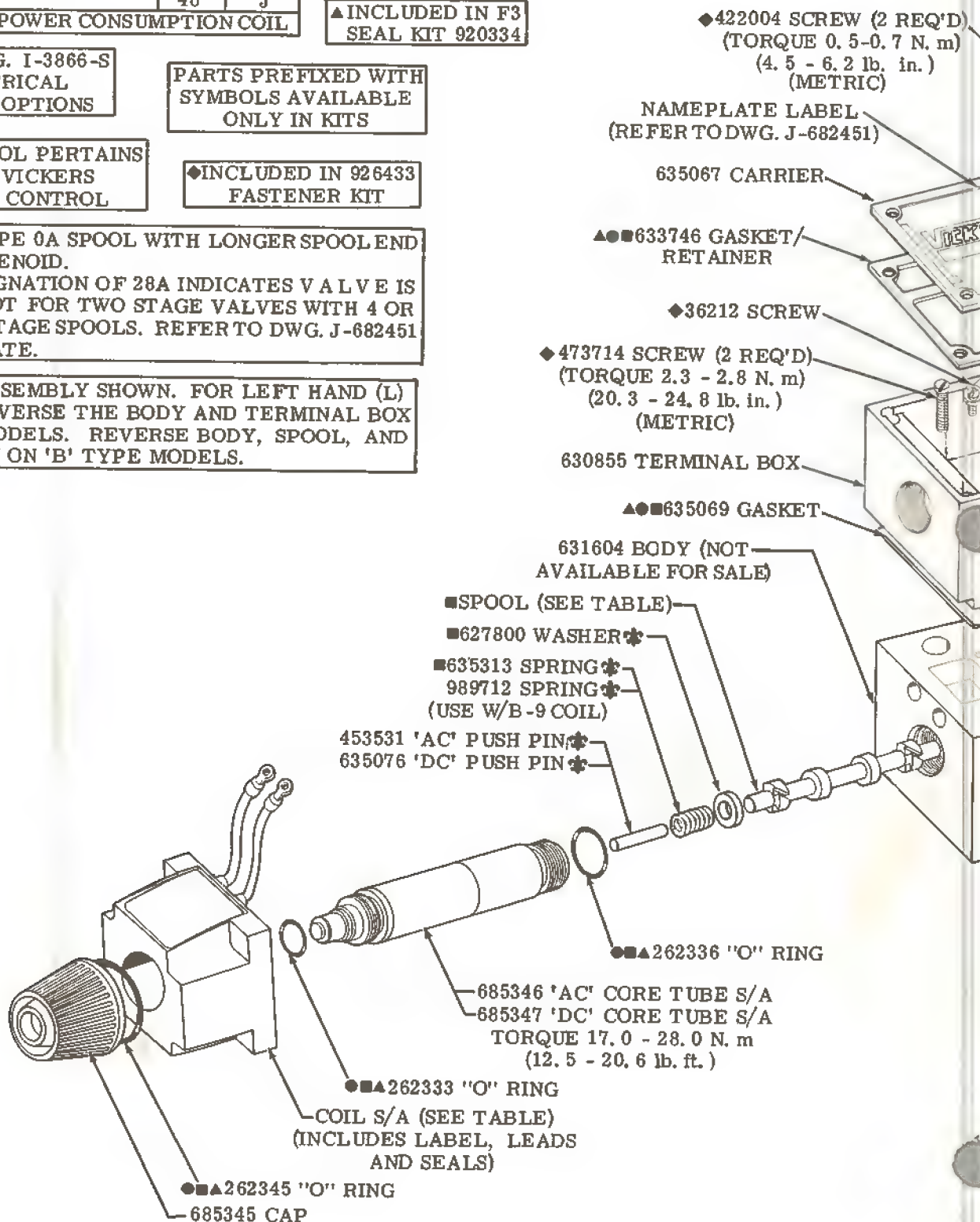
PARTS PREFIXED WITH
SYMBOLS AVAILABLE
ONLY IN KITS

✱ SUFFIX SYMBOL PERTAINS
ONLY TO VICKERS
MATERIAL CONTROL

◆ INCLUDED IN 926433
FASTENER KIT

- ASSEMBLE TYPE 0A SPOOL WITH LONGER SPOOL END TOWARDS SOLENOID.
- A SPOOL DESIGNATION OF 28A INDICATES VALVE IS USED AS A PILOT FOR TWO STAGE VALVES WITH 4 OR 8 TYPE MAIN STAGE SPOOLS. REFER TO DWG. J-682451 FOR NAMEPLATE.

RIGHT HAND ASSEMBLY SHOWN. FOR LEFT HAND (L) ASSEMBLY, REVERSE THE BODY AND TERMINAL BOX ON 'A' TYPE MODELS. REVERSE BODY, SPOOL, AND TERMINAL BOX ON 'B' TYPE MODELS.



Service Parts Information

**Directional
Valve
With
Monitor
Switch**

DG4V-3-*(*)*(L)-MS(*)-**-*-40



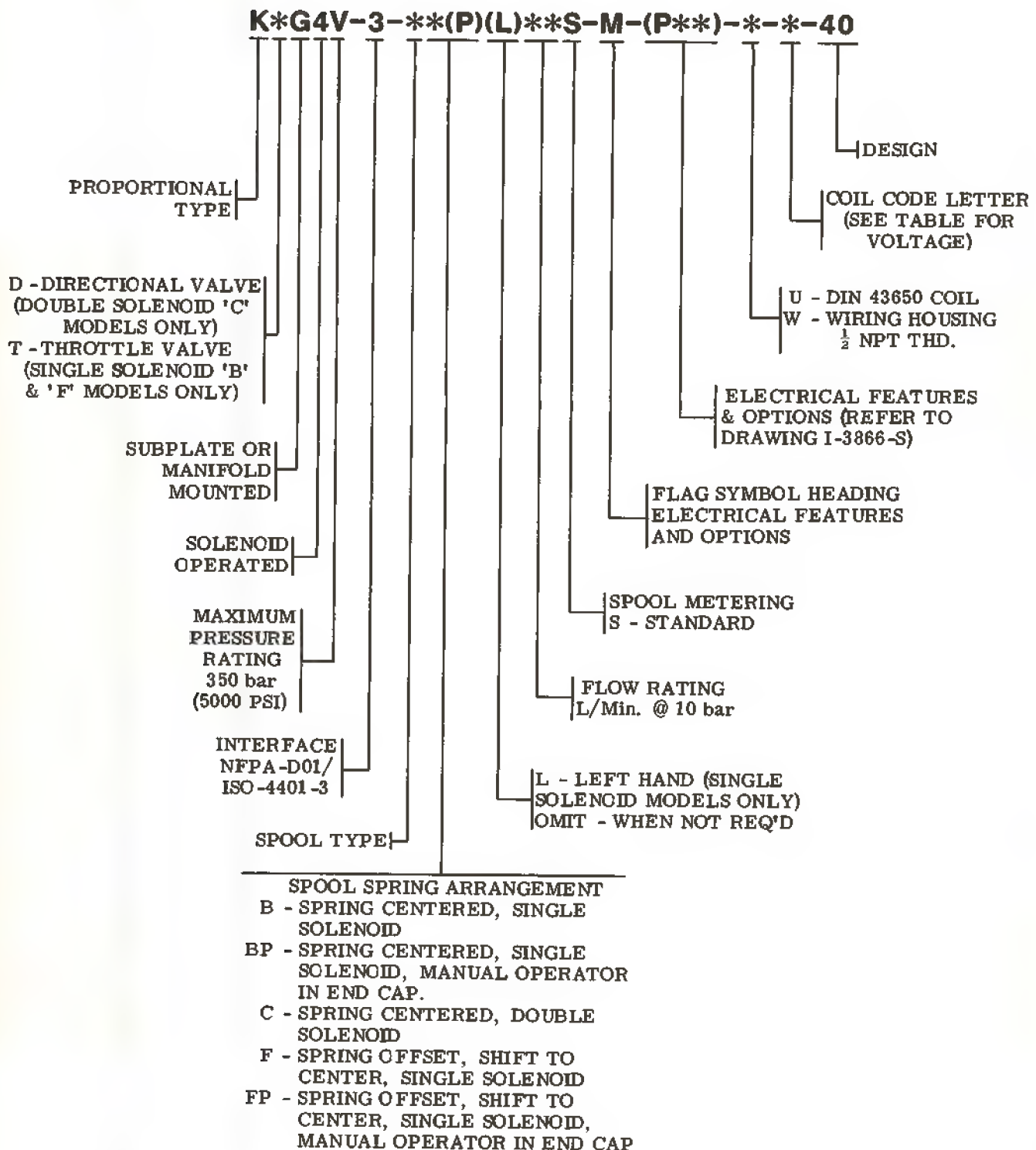
Vickers, Incorporated

P.O. Box 302
Troy, Michigan 48007-0302

Released 9-1-85

I-3859-S

MODEL CODE BREAKDOWN



For satisfactory service life of these components, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from OFP, OFR and OFRS filter series are recommended.

Litho in U. S. A.

SCREW (METRIC)	
STD REQ'D)	DIN 43650 (2 REQ'D)
422004	468641
TORQUE 0.5-0.9 N.m (4.5 - 6.2 lb. in.)	

19583 SEAL (2 REQ'D)
F SHOWN)(WHEN USING
468641 SCREW FOR
DIN 43650 MODELS)

576915 SCREW
473714 SCREW (2 REQ'D)
(TORQUE 2.3-2.8 N.m)
(20.3-24.8 lb. in.)
(METRIC)

64765 PLUG

676560 PLUG
(B & F MODELS)

686626 SPRING
(B & F MODELS)

632165 SPRING
(C MODEL ONLY)

627789 WASHER

689614 WASHER
(F MODEL ONLY)

2553 ROLL PIN

O' RING
Q'D)

AVAILABLE LOT KITS
(25 PCS.)

PART #	KIT #
36212	944053
64765	944042
422004	944066
468641	944012
472553	944008
627789	944000
632165	944025
635076	944003
676272	944010
686626	944024
689613	944078
689614	944079

'BP' & 'FP' Manual Override

676270 END CAP
(TORQUE 17.0-28.0 N.m)
(12.5 - 20.6 lb. in.)

262336 "O" RING

676272 PLUNGER

262332 "O" RING

B - Spring Centered -
Solenoid 'A' Removed

F - Spring Offset -
Shift to Center

676268 END CAP
(TORQUE 17.0-28.0 N.m)
(12.5 - 20.6 lb. in.)

262336 "O" RING

685345 END CAP

262345 "O" RING

COIL S/A (SEE TABLE)
(INCLUDES LABEL, LEADS
AND SEALS)

262333 "O" RING

682534 CORE TUBE S/A
(TORQUE 17.0-28.0 N.m)
(12.5 - 20.6 lb. ft.)

C - Spring
Centered

262336 "O" RING

635076 PUSH PIN

DIN 43650 COIL
(SEE TABLE)
(INCLUDES LABEL)

DIN 43650 COIL S/A	COIL S/A	DC VOLT	COIL CODE
685352	686030	12	G
685353	686031	24	H

▲ INCLUDED IN
920304 SEAL KIT

● OMIT WHEN USING
MODELS WITH DIN
43650 COILS.

◆ INCLUDED IN 926433
FASTENER KIT

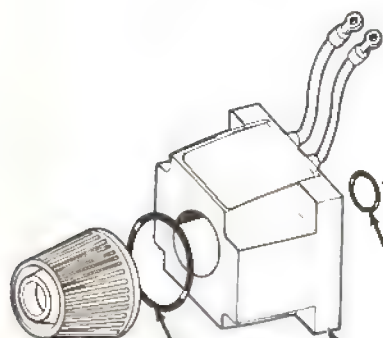
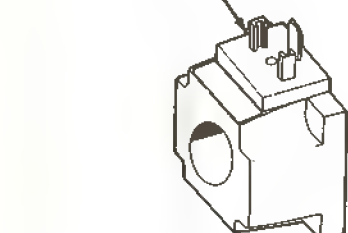
* ASSEMBLE ROUNDED FACE
OF WASHER TO MATE
WITH SPOOL

REFER TO DWG. I-3866-S
FOR ELECTRICAL
FEATURES & OPTIONS

RIGHT HAND ASS'Y SHOWN FOR ALL SINGLE SOLENOID
MODELS. FOR LEFT HAND ASS'Y, ALL PARTS ARE
REVERSED EXCEPT BODY & TERMINAL BOX. CON-
VERSION FROM R. H. TO L. H. BY CUSTOMER IS NOT
RECOMMENDED.

DIN 43650 COIL MATING
RECEPTACLES (NOT SHOWN)
710776 "A" SOLENOID (GREY)
710775 "B" SOLENOID (BLACK)

DIN 43650 COIL
(SEE TABLE)
(INCLUDES LABEL)



685345 END CAP

COIL S/A (SEE TABLE)
(INCLUDES LABEL, LEADS
AND SEALS)

▲ 262345 "O" RING

▲ 262333 "O" RING

682534 CORE TUBE S/A
(TORQUE 17.0-28.0 N.m)
(12.5 - 20.6 lb. ft.)

632165 SPRING*
(C MODEL ONLY)

▲ 262336 "O" RING

635076 PUSH PIN*
(B & C MODELS)
689613 PUSH PIN*
(F MODEL ONLY)

* 627789 WASHER*
(C MODEL ONLY)

631604 BODY (NOT
AVAILABLE FOR SALE)

SPOOL (NOT
AVAILABLE
FOR SALE)

● 635069 GASKET

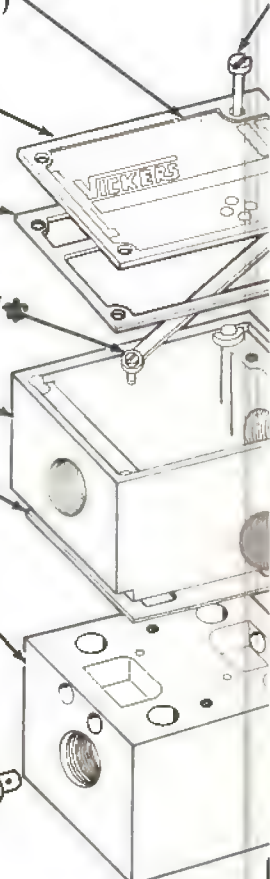
● 630855 TERMINAL BOX

● 36212 SCREW*

● 633746 GASKET/
RETAINER

NAMEPLATE LABEL
(STD MODEL REFER TO J-682451)
(DIN 43650 REFER TO J-685777)

635067 CARRIER (STD)
989585 CARRIER (DIN 43650)



Service Parts Information

Proportional
Type
Directional
Valve

KDG4V-3-*(P)(L)**S-M-(P**)-*-*-40
KTG4V-3-*(P)(L)**S-M-(P**)-*-*-40



Vickers, Incorporated

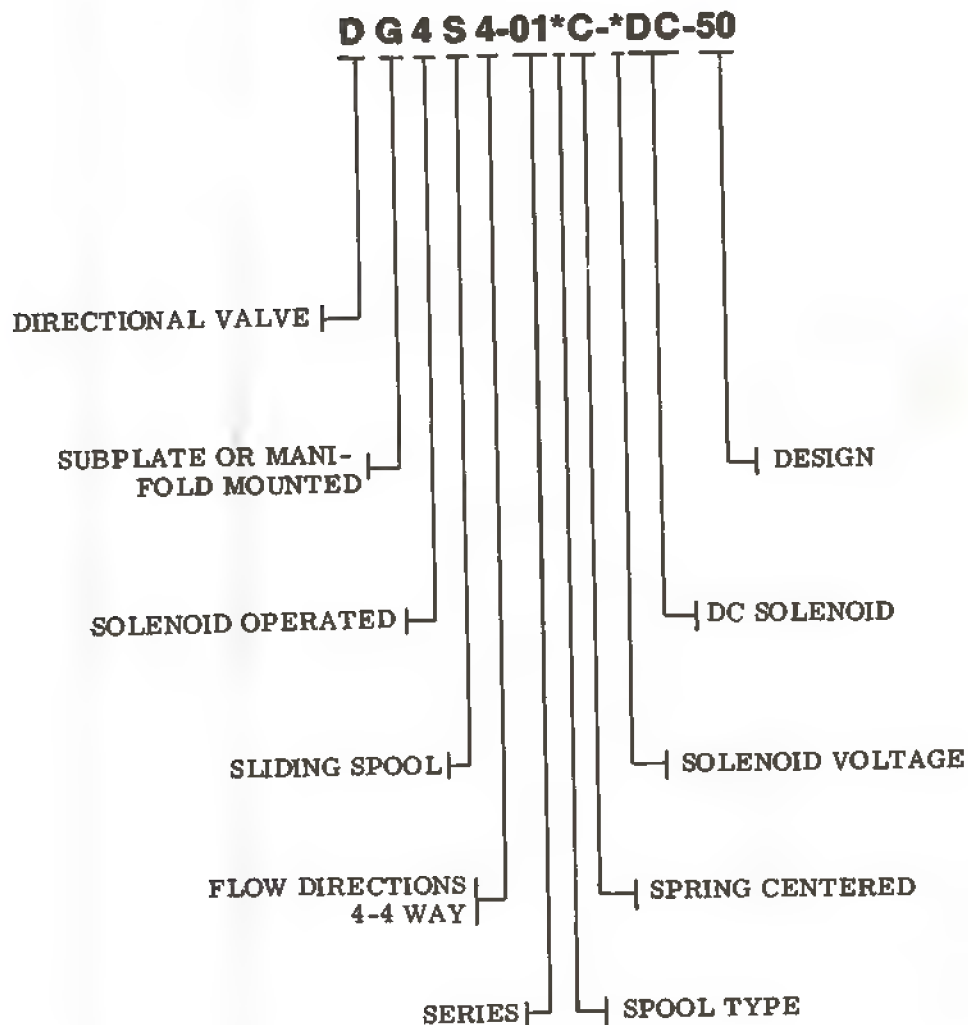
P.O. Box 302
Troy, Michigan 48007-0302

Revised 12-1-87

I-3860-S

125

MODEL CODE BREAKDOWN



For satisfactory service life of these components, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from Vickers OFP, OFR, and OFRS series are recommended.

Litho in U.S.A.

Service Parts Information

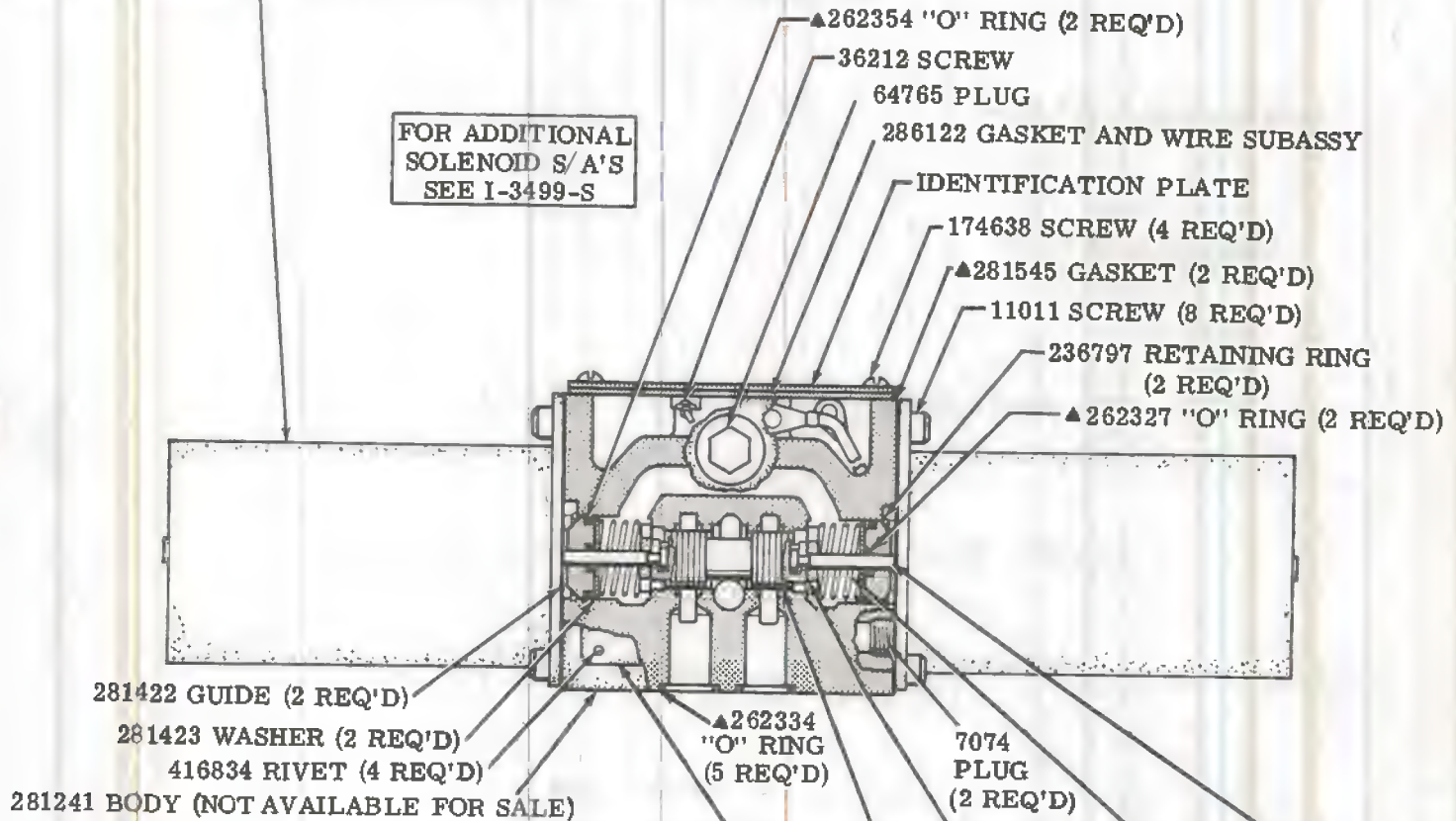
VICKERS

A TRIMMOVA COMPANY

**SPRING CENTERED
SOLENOID CONTROLLED
DIRECTIONAL VALVES**

DG4S4-01*C-*DC-50

VOLTAGE	SOLENOID S/A (2 REQ'D)	COIL S/A (2 REQ'D)	SOLENOID S/A F3 (2 REQ'D)	COIL S/A F3 (2 REQ'D)
12 DC	290839	291583	751283	751284
24 DC	290840	291584	393091	393090



▲INCLUDED IN
SEAL KIT 919359

MODEL	DIAGRAM PLATE	SPOOL	WASHER (2 REQ'D)	SPRING (2 REQ'D)	PUSH PIN (2 REQ'D)
DG4S4-010C-*DC-50	290341	213230	211846	290072	213268
DG4S4-012C-*DC-50	290343	213231			
DG4S4-013C-*DC-50	290344	239903			
DG4S4-016C-*DC-50	290345	213232			
DG4S4-017C-*DC-50	290346	236624	283637	217323	290264
DG4S4-018C-*DC-50	290340	235637			
DG4S4-0133C-*DC-50	577484	236615	211846	290072	213268

Vickers, Incorporated
P.O. Box 302
Troy, Michigan 48007-0302

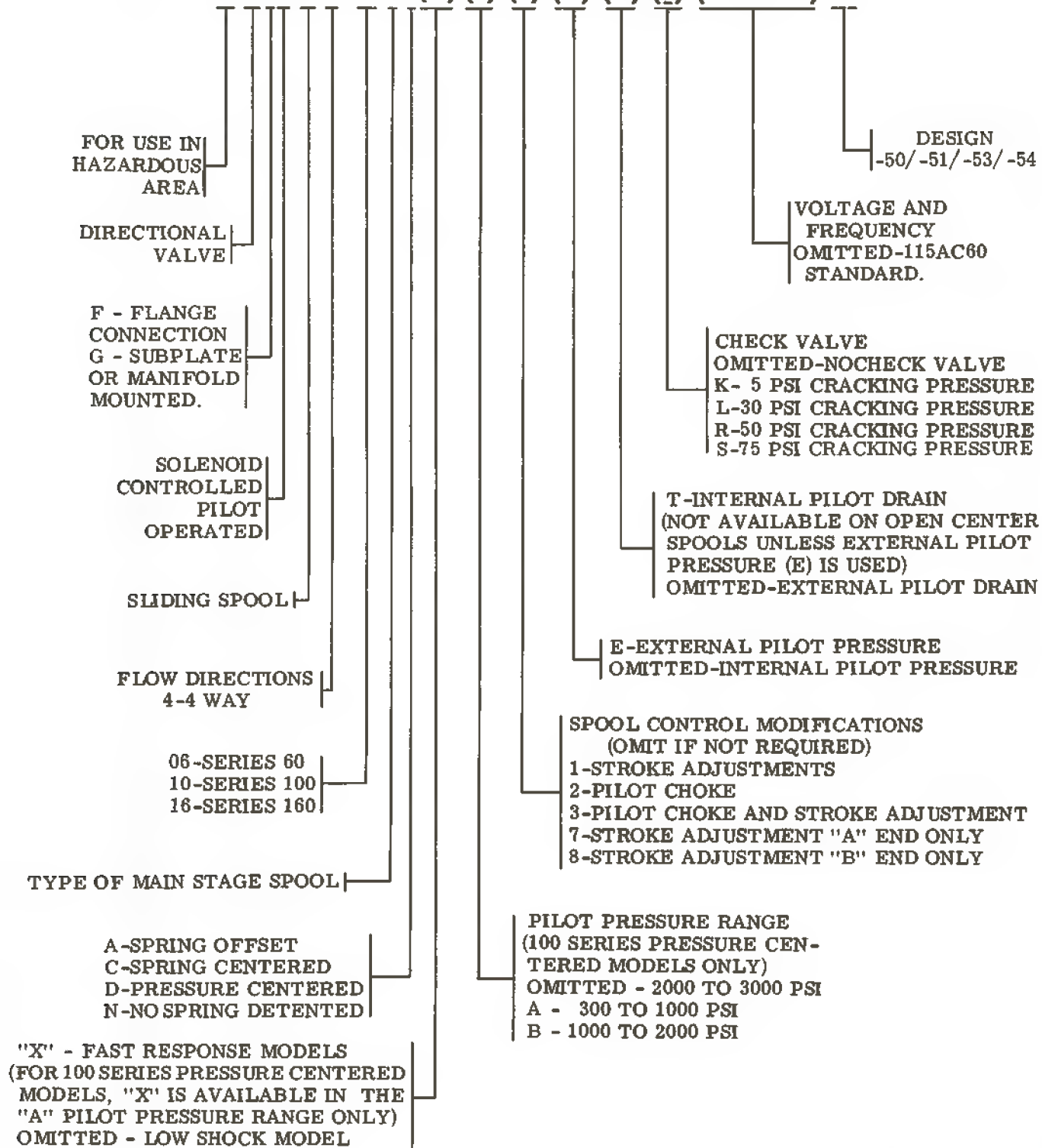
Revised 11-1-85

I-3506-S

124

MODEL CODE BREAKDOWN

X D*5 S 4 - *(X) (*)-(*)-(E)-(T)-(*)-(***AC**)-5***



For satisfactory service life of these components, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from Vickers OFF, OFR, and OFRS series are recommended.

Litho in U. S. A.

Service Parts Information

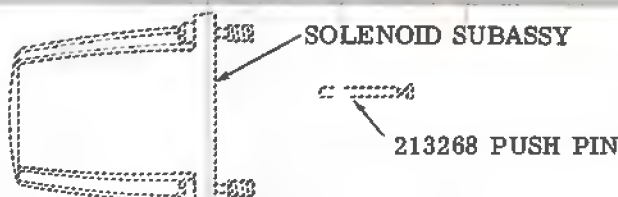
**DIRECTIONAL VALVES
FOR USE IN
HAZARDOUS LOCATIONS**

XD*5S4-****-(*)-(*)-(*)-(E)-(T)-(*)-5*

VICKERS.

A TRIMONA COMPANY

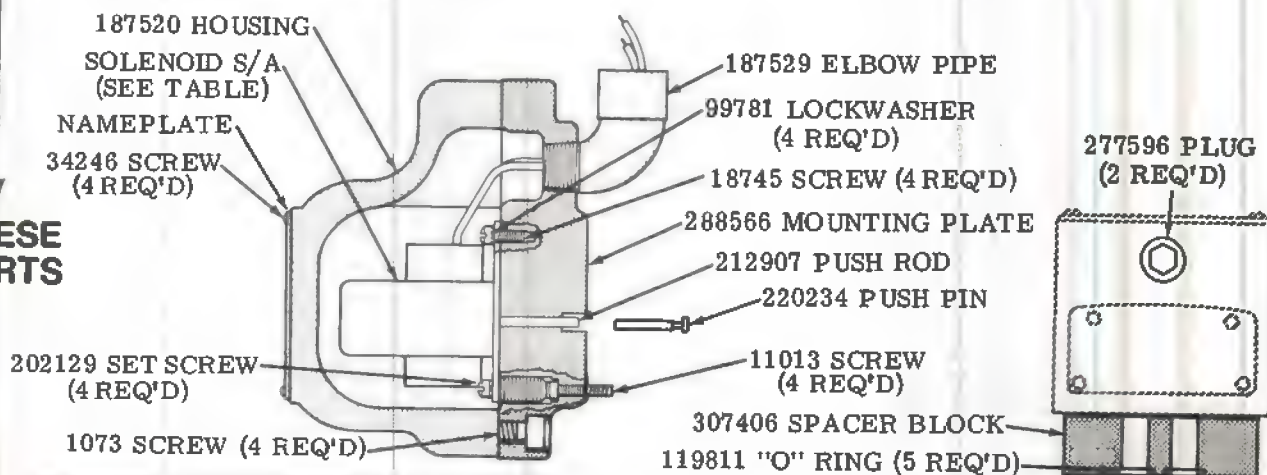
**THESE
PARTS
ARE
REPLACED
BY**



**THE SAME
CHANGE
APPLIES TO
THIS END
FOR MODELS
WITH TWO
SOLENOIDS**

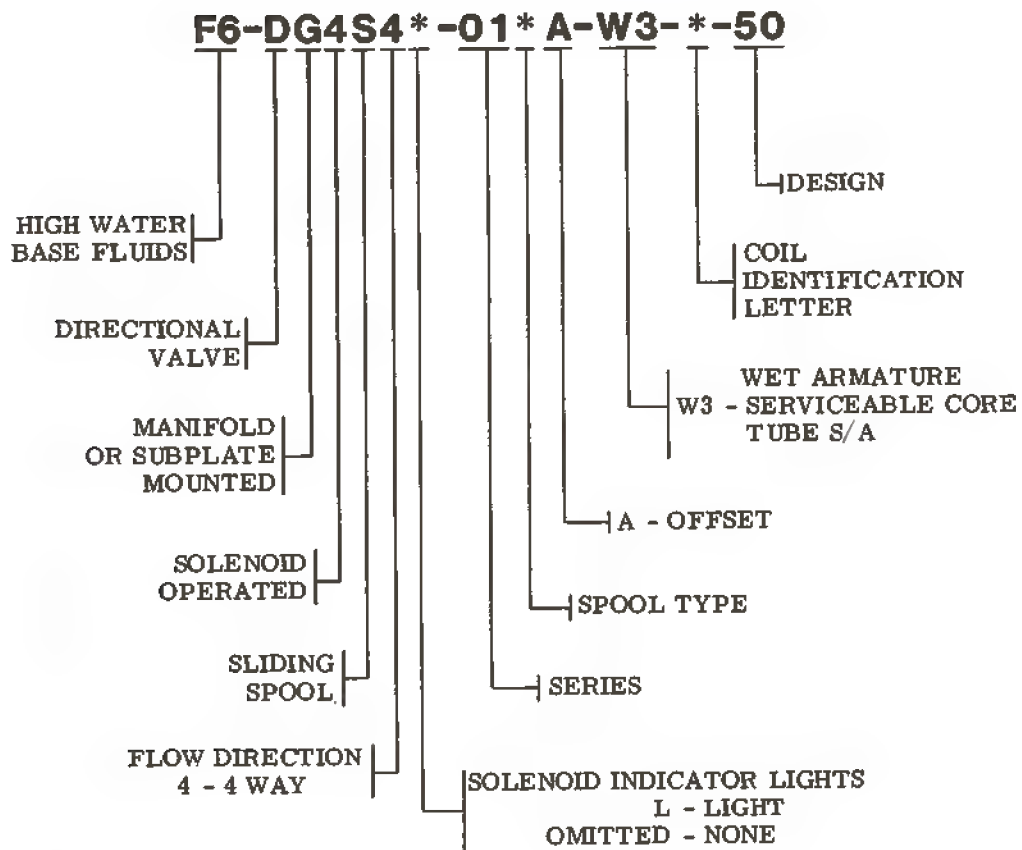
VOLTAGE	SOLENOID S/A	COIL
115 AC 60	288564	142249
230 AC 60	288565	142251

**THESE
PARTS**



ON MODEL	SHOWN ON DRAWING			TO MAKE MODEL
	-50	-51	-53/-54	
DF5S4-16*A-50/-53	I-3486-S		I-3622-S	XDF5S4-16*A--50/-53
DF5S4-16*B-53				XDF5S4-16*B--53
DF5S4-16*C-50/-53	I-3482-S			XDF5S4-16*C--50/-53
DF5S4-16*N-50/-51/-53	I-3482-S	I-3482-S		XDF5S4-16*N--50/-51/-53
DG5S4-06*A-50/-51	I-3492-S	I-3502-S		XDG5S4-06*A--50/-51
DG5S4-06*C-50/-51	I-3490-S	I-3473-S		XDG5S4-06*C--50/-51
DG5S4-06*D-50/-51	I-3493-S	I-3504-S		XDG5S4-06*D--50/-51
DG5S4-06*N-50/-51	I-3491-S	I-3474-S		XDG5S4-06*N--50/-51
DG5S4-10*A-50/-51/-53/-54	I-3496-S	I-3513-S	I-3624-S	XDG5S4-10*A--50/-51/-53/-54
DG5S4-10*B-53/-54				XDG5S4-10*B--53/-54
DG5S4-10*C-50/-51/-53/-54	I-3494-S	I-3509-S		XDG5S4-10*C--50/-51/-53/-54
DG5S4-10*D-50/-51/-53/-54	I-3497-S	I-3514-S		XDG5S4-10*D--50/-51/-53/-54
DG5S4-10*N-50/-51/-53/-54	I-3495-S	I-3512-S	I-3624-S	XDG5S4-10*N--50/-51/-53/-54

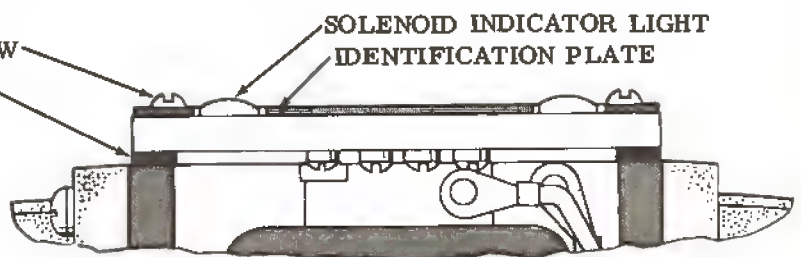
MODEL CODE BREAKDOWN



FOR MODELS WITH
SOLENOID INDICATOR LIGHTS

SOLENOID INDICATOR LIGHT KIT (INCLUDES ALL PARTS IDENTIFIED)	
VOLTAGE RANGE	KIT
100 thru 127	941615
192 thru 233	941617

298785 SCREW
298782 GASKET



NOTE
REFER TO PARTS DRAWING I-3487-S
FOR MODELS WITH PLUG-IN FEATURE.

For satisfactory service life of these components in industrial applications, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from Vickers OFP, OFR, and OFRS series are recommended.

Litho in U.S.A.

*□174638 SCREW (4 REQ'D)
TORQUE 7 - 9 lb. in.

NAMEPLATE (NOT
AVAILABLE FOR SALE)

*286122 GASKET
& WIRE S/A

□11012 SCREW
(4 REQ'D)
TORQUE
43-53 lb. in.

*□36212 SCREW

400846 COVER

▲263493 "O" RING

*407533 PLUG
TORQUE
107 - 110 lb. in.

■236451 SPRING

▲262344 "O" RING

*407533 PLUG (TORQUE
107 - 110 lb. in.)

▲263493 "O" RING

*64765 PLUG

BODY (NOT
AVAILABLE
FOR SALE)

●▲262334 "O" RING
(5 REQ'D)

■DIAGRAM PLATE
(SEE TABLE)

*□■416834 RIVET
(4 REQ'D)

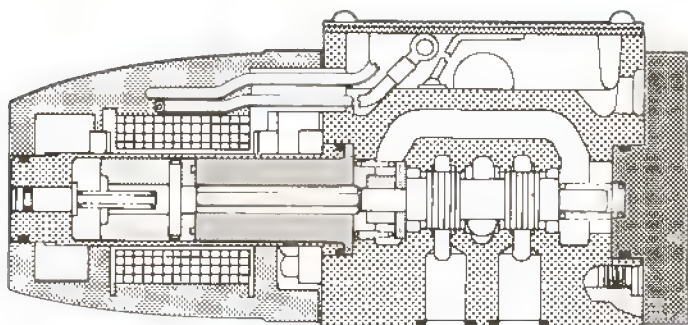
□ INCLUDED IN
FASTENER KIT 942465

* LOT KITS
(25 PCS. ONLY)

PART #	KIT #
174638	944054
286122	944043
36212	944053
407533	944040
416834	944027
64765	944042
400809	926310

▲ INCLUDED IN
F3 SEAL KIT 920109

◉ INCLUDED IN 941493 AC
CORE TUBE KIT
◉ INCLUDED IN 941416 DC
CORE TUBE KIT



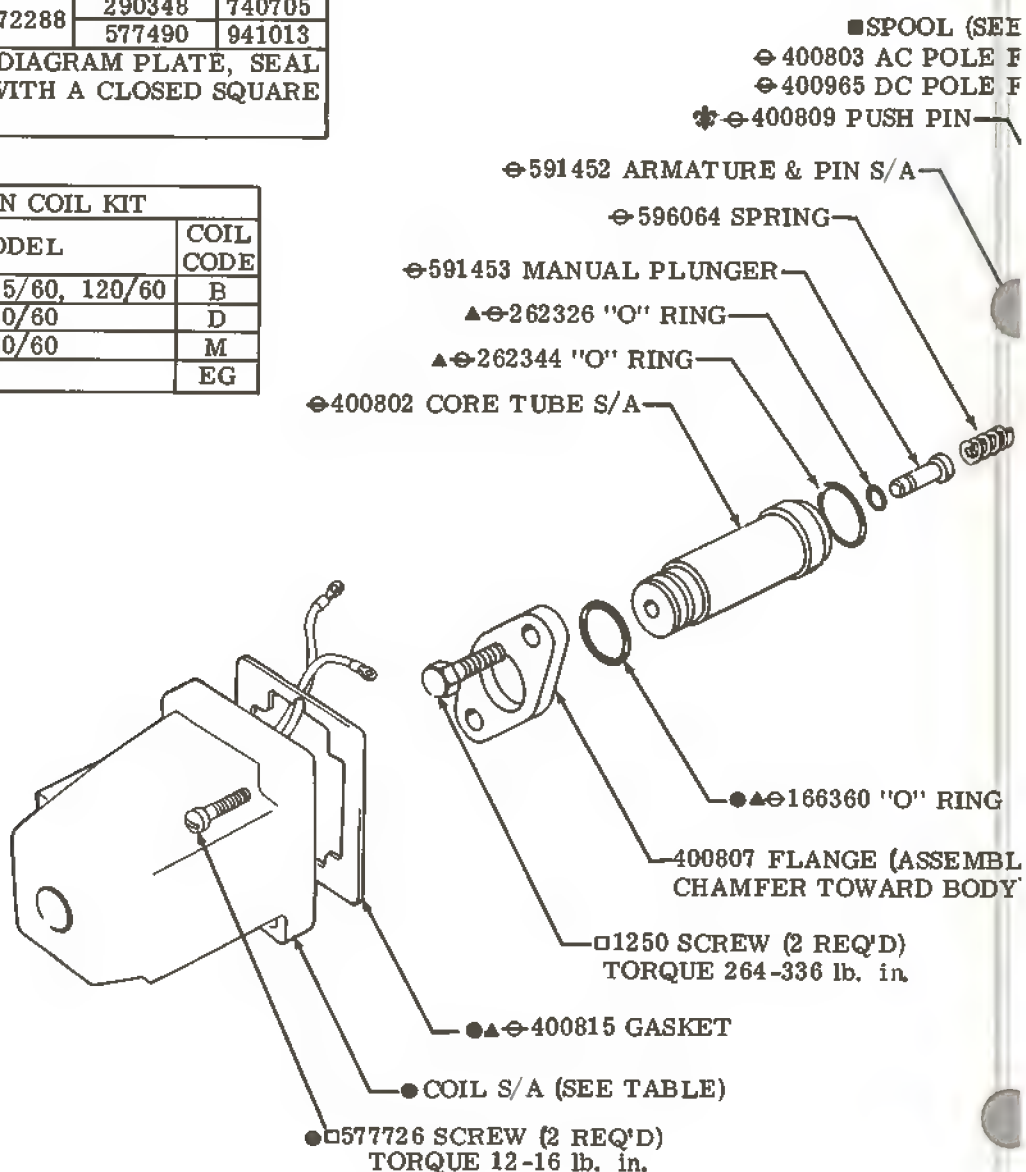
NOTE
PART NUMBERS PREFIXED WITH
A SYMBOL ARE AVAILABLE ONLY
AS SERVICE KITS.

NOTE
RIGHT HAND ASSEMBLY SHOWN. FOR LEFT H
ASSEMBLY ALL PARTS, EXCEPT BODY, ARE
VERSED. EXAMPLE OF LEFT HAND MODEL
F6-DG4S4-012A-W3-* -50-LH.

MODEL	SPOOL	DIAGRAM PLATE	SPOOL KIT
F6-DG4S4-010A-W3-* -50	572287	290348	940703
F6-DG4S4-010A-W3-* -50LH		577490	941011
F6-DG4S4-012A-W3-* -50	463426	290348	940704
F6-DG4S4-012A-W3-* -50LH		577490	941012
F6-DG4S4-016A-W3-* -50	572288	290348	740705
F6-DG4S4-016A-W3-* -50LH		577490	941013

SPOOL KIT INCLUDES SPOOL, DIAGRAM PLATE, SEAL
KIT, AND PARTS PREFIXED WITH A CLOSED SQUARE
SYMBOL (■).

● INCLUDED IN COIL KIT			
● COIL S/A	COIL KIT	MODEL	COIL CODE
400823	942466	110/50, 115/60, 120/60	B
400824	942467	220/50, 230/60	D
400825	942468	440/50, 460/60	M
435755	941017	127/50	EG



VICKERS®
A TRIMONA COMPANY

Service Parts Information

**Wet Armature
Solenoid
Operated
Directional
Valves**

F6-DG4S4-01 *A-W3-* -50



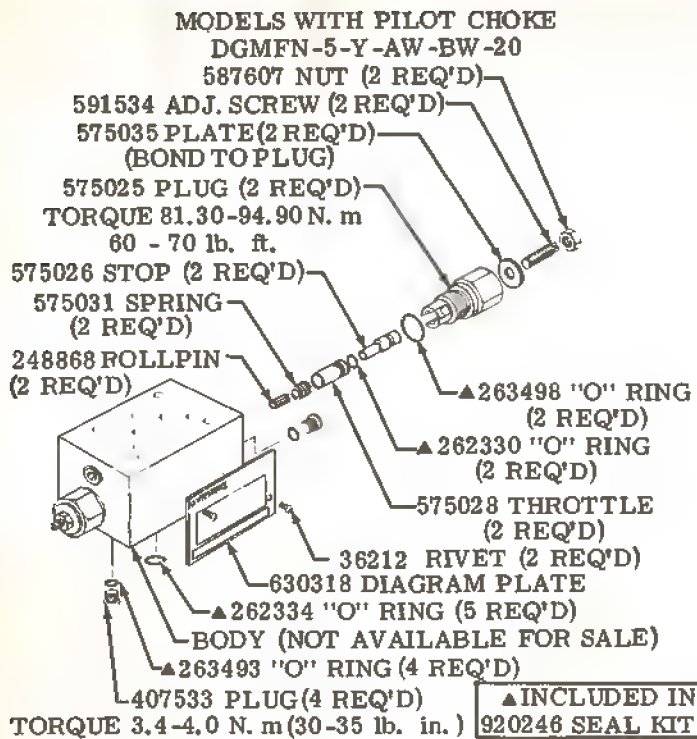
Vickers, Incorporated

1401 Crooks Road
Troy, Michigan 48064

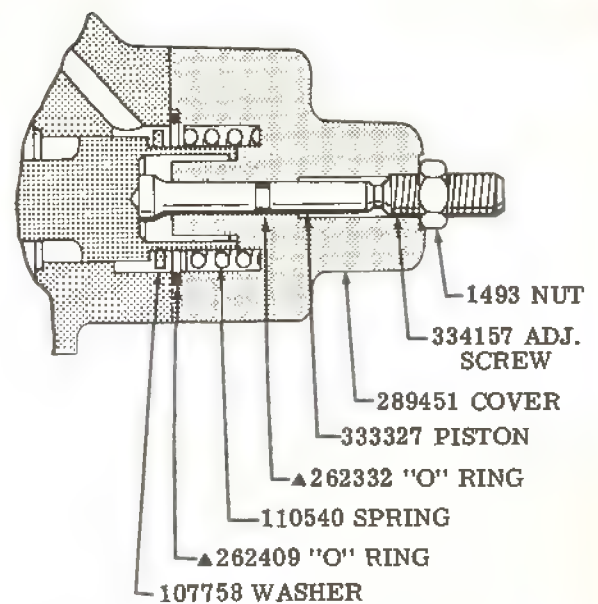
Revised 5-1-87

I-3641-S

121



STROKE ADJUSTMENT PARTS



MODEL CODE BREAKDOWN

(F3) (P**) -DG5S4(L) -10*D(*) (X)(**) - (E) - W(3) - (*) -53

MULTI-FLUID
CAPABILITY
(VITON SEALS)

ELECTRICAL PLUG
FEATURE (SEE
NOTE BELOW)

DIRECTIONAL VALVE

SUBPLATE OR
MANIFOLD MOUNTED

SOLENOID
CONTROLLED
PILOT
OPERATED

SLIDING SPOOL

FLOW
DIRECTIONS
4 - 4 WAY

L - SOLENOID INDICATOR
LIGHTS
OMITTED - NONE

1, 25 INCH SERIES 100

TYPE OF MAIN STAGE SPOOL

DESIGN

COIL IDENT. LETTER

W - NONSERVICEABLE
CORE TUBE
W3 - SERVICEABLE CORE
TUBE

E - EXTERNAL PILOT PRESS
OMITTED - INTERNAL PILOT
PRESSURE

SPOOL CONTROL MODIFICATION
(OMIT WHEN NOT REQUIRED)

2 - PILOT CHOKE ADJUSTMENT
8 - STROKE ADJ. CYLINDER "B"
END ONLY
2-8 - IF BOTH ARE REQUIRED

"X" - FAST RESPONSE MODEL
(AVAILABLE ONLY FOR
"A" PILOT PRESS RANGE)
OMITTED - LOW SHOCK MODEL

PILOT PRESSURE RANGE

A - 300 TO 1000 PSI (20.0 - 70.0 bar)
B - 1000 TO 2000 PSI (70.0 - 138.0 bar)
OMITTED - 2000 TO 3000 PSI (138.0 - 207.0 bar)

PRESSURE CENTERED

ELECTRICAL PLUG FEATURE (OMIT IF NOT REQUIRED)

PA - INSTA-PLUG, MALE RECEPTACLE ONLY
PB - INSTA-PLUG, MALE & FEMALE RECEPTACLE

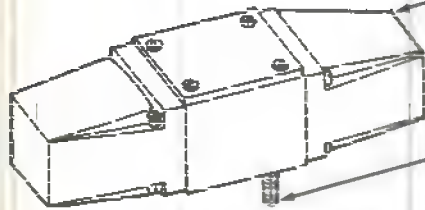
PA3 (3 PIN) & PA5 (5 PIN) RECEPTABLES THAT MEET
NFPA HYDRAULIC VALVE ELECTRICAL STANDARD
T3.5.29M-1980.

For satisfactory service life of these components in industrial applications, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from Vickers OFP, OFR, and OFRS series are recommended.

Litho in U. S. A.

MODEL	MAIN STAGE SPOOL TYPE	REFER TO DRAWING
DG4S4-017C-W-*50	0, 1, 2, 3, 6, 9 & 33	I-3558-S
DG4S4-0178C-W-*50	4 & 8	

PILOT ATTACHING PARTS		
BOLT (4 REQ'D)	L'WASHER (4 REQ'D)	MODEL
□ 1034	□ 68907	W/OUT PILOT CHOKE
□ 10938		W/PILOT CHOKE
TORQUE TO 100-112 lb. in. (11.3-13.56 N. m.)		
SEE BACK PAGE FOR PILOT CHOKE PARTS BREAKDOWN		



▲199811 "O" RING
(5 REQ'D) (REF.)
(NITRILE)

*■363889 PLUG

▲263495 "O" RING

*■407533 PLUG

▲263493 "O" RING

*■7074 PLUG

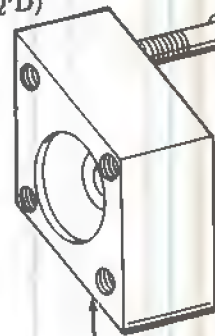
*■407533 PLUG

▲263493 "O" RING

◇298168 SCREW (4 REQ'D)
TORQUE TO 150-170 lb. ft.
(203.4-230.5 N. m.)

▲263493 "O" RING (2 REQ'D)

*■407533 PLUG
(2 REQ'D)



276948 COVER

▲262409 "O" RING

110540 SPRING

107758 WASHER

▲263494 "O" RING (2 REQ'D)

*■407533 PLUG (2 REQ'D)

*■"A" PLUG (SEE TABLE)

▲263495 "O" RING

*■363889 PLUG

195940 REST PIN (2 REQ'D)

▲154014 "O" RING (NITRILE)

LE)
NG (NITRILE)

▲154026 "O" RING (4 REQ'D)
A, B, P & T PORT) (NITRILE)

▲263493 "O" RING

*■407533 PLUG

▲263494 "O" RING
(2 REQ'D)

*■343740 PLUG
(2 REQ'D)

NOTE
SAE STRAIGHT THREAD PLUGS
USED ON EXTERIOR OF VALVE

MODEL	SPOOL	I.D. PLATE WITH CIRCUIT DIAGRAM
DG5S4-100D-53	364037	400967
DG5S4-101D-53	*331404	400968
DG5S4-102D-53	364038	400969
DG5S4-103D-53	*277479	400970
DG5S4-104D-53	281193	400971
DG5S4-106D-53	364039	400972
DG5S4-108D-53	364041	400971
DG5S4-109D-53	277563	400967
DG5S4-1033D-53	364042	400972

*ASSEMBLE TYPE 1 & 3 SPOOLS WITH NARROW CENTER LAND TOWARD "A" END OF VALVE. "A" END IS DEFINED AS BEING CLOSEST TO CYLINDER PORT "A".

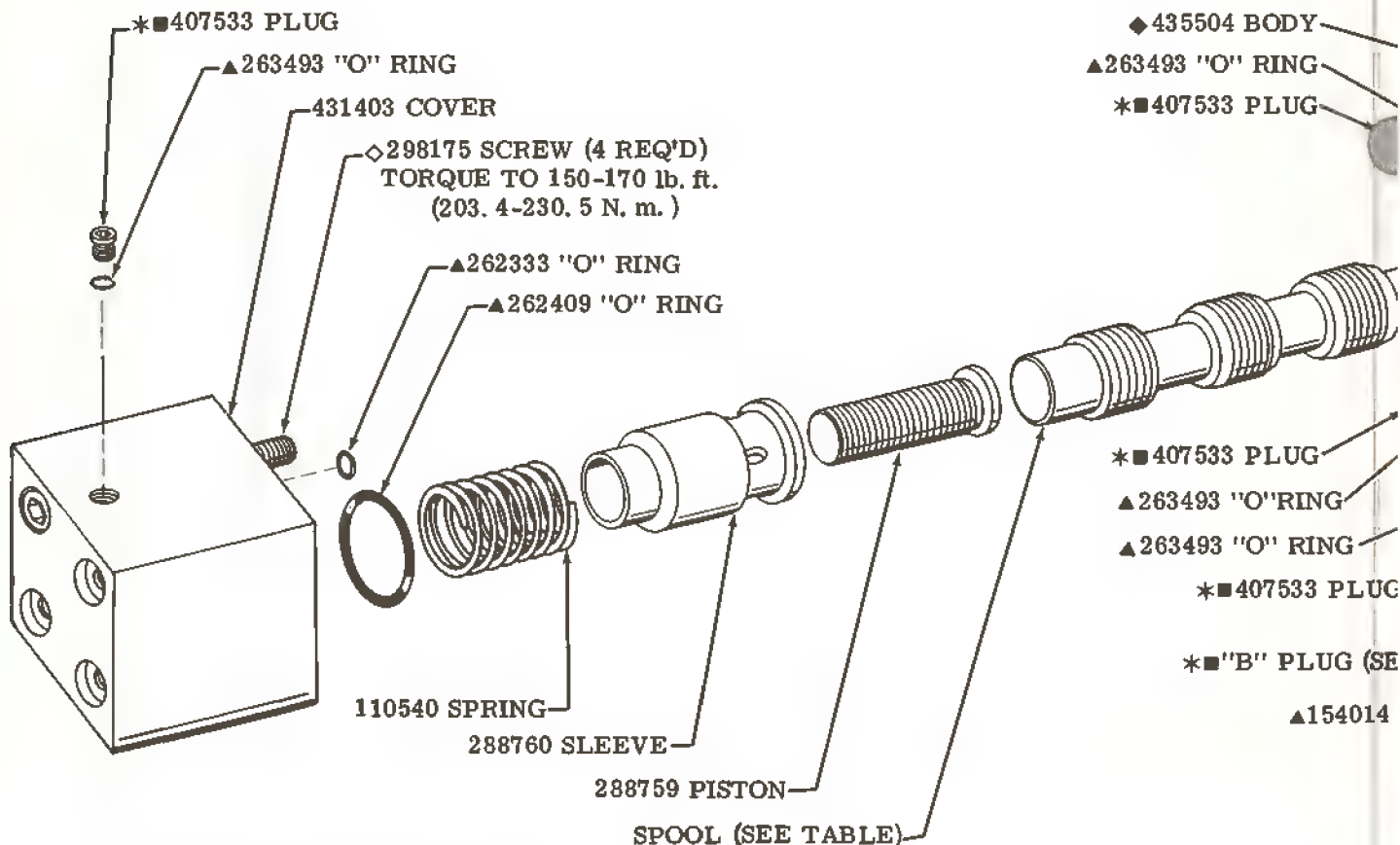
SEAL KIT NOTE

The -53 design valves are manufactured as shown with F3 seals used internally. Interface seals are standard Nitrile material and are converted to F3 in the seal kit. All seals in the seal kit are F3.

PLUG INSTALLATION TABLE		
MODEL	PLUG "A"	PLUG "B"
-10*D-53	226987	OUT
-10*D-E-53	7074	226987
-10*DA-53	30560	OUT
-10*DA-E-53	7074	30560
-10*DAX-53	OUT	OUT
-10*DAX-E-53	7074	
-10*DB-53	224026	
-10*DB-E-53	7074	224026

7074 NPTF PIPE PLUG. OTHERS ARE NPT FORIFICE PLUGS.

PLUG TORQUES (OILED)		
PLUG	N. m	lb. in.
7074	8.5 - 9.6	75-85
7075	20.0-23.0	180-205
30560	8.5 - 9.6	75-85
224026	8.5 - 9.6	75-85
226987	8.5 - 9.6	75-85
343740	10.0-11.8	90-105
363889	16.9-18.0	150-160
407533	3.4 - 4.0	30-35



- ▲INCLUDED IN F3 SEAL KIT 920213
- ◆INCLUDED IN FASTENER KIT 941262
- INCLUDED IN BOLT KIT 255633
- INCLUDED IN BOLT KIT 255654
- *INCLUDED IN PLUG KIT 941263
- PLUG TORQUES SEE TABLE
- ◆NOT AVAILABLE FOR SALE

NOTE
PARTS INCLUDED IN SERVICE
KITS NOT SOLD SEPARATELY



Service Parts Information

**Wet Armature
Pressure Centered
Solenoid Controlled
Pilot Operated
Directional
Control Valves**

DG5S4(L)-10*D(X)-W-*-53



Vickers, Incorporated

1401 Crooks Road
Troy, Michigan 48064

Revised 11-1-85

I-3628-S

120

MODELS WITH PILOT CHOKE

DGMFN-5-Y-AW-BW-20

587607 NUT (2 REQ'D)

591534 ADJ. SCREW (2 REQ'D)

575035 PLATE (2 REQ'D)
(BOND TO PLUG)

575025 PLUG (2 REQ'D)

TORQUE 81.30-94.90 N. m

60 - 70 lb. ft.

575026 STOP (2 REQ'D)

575031 SPRING
(2 REQ'D)

248868 ROLL PIN
(2 REQ'D)

▲263498 "O" RING
(2 REQ'D)

▲262330 "O" RING
(2 REQ'D)

575028 THROTTLE
(2 REQ'D)

36212 RIVET (2 REQ'D)

630318 DIAGRAM PLATE

▲262334 "O" RING (5 REQ'D)

BODY (NOT AVAILABLE FOR SALE)

▲263493 "O" RING (4 REQ'D)

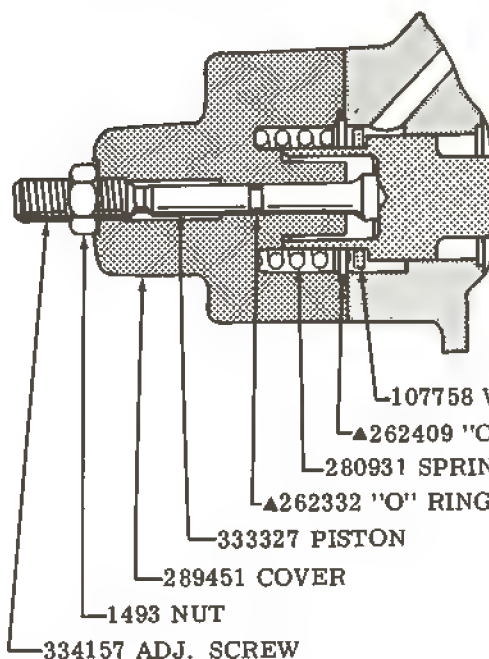
407533 PLUG (4 REQ'D)

▲INCLUDED IN

TORQUE 3.4-4.0 N. m (30-35 lb. in.)

920246 SEAL KIT

STROKE ADJUSTMENT PARTS



107758 WASHER

▲262409 "O" RING

280931 SPRING

▲262332 "O" RING

333327 PISTON

289451 COVER

1493 NUT

334157 ADJ. SCREW

MODEL CODE BREAKDOWN

(F3)-(P**) DG5S4(L)-10**(X)(*)-(E)-(T)(*)-W(3)*-53-(LH)

MULTI-FLUID
CAPABILITY
(VITON SEALS)

ELECTRICAL PLUG
FEATURE (SEE
NOTE BELOW)

DIRECTIONAL VALVE

SUBPLATE OR
MANIFOLD MOUNTED

SOLENOID CONTROLLED
PILOT OPERATED

SLIDING SPOOL

FLOW DIRECTIONS

4 - 4 WAY

L - SOLENOID INDICATOR LIGHTS

OMITTED - NONE

1.25 INCH SERIES 100

TYPE OF MAIN STAGE SPOOL

VALVE TYPE

A - SPRING OFFSET

B - SPRING CENTERED
(ONE SOLENOID)

C - SPRING CENTERED

N - NO SPRING DETENTED

X - FAST RESPONSE MODEL

OMITTED - LOW SHOCK MODEL

LEFT
HAND
ASSEMBLY

DESIGN

COIL IDENT. LETTER

W - NONSERVICEABLE CORE
TUBE IN PILOT

W3 - SERVICEABLE CORE
TUBE IN PILOT

CHECK VALVE

OMITTED - NO CHECK VALVE

K - 5 PSI (0.35 bar)

L - 30 PSI (2.14 bar)

R - 50 PSI (3.45 bar)

S - 75 PSI (5.2 bar)

T - INTERNAL PILOT DRAIN

OMITTED - EXTERNAL PILOT DRAIN

E - EXTERNAL PILOT PRESSURE

OMITTED - INTERNAL PILOT PRESS.

SPOOL CONTROL MODIFICATIONS
(OMIT IF NOT REQUIRED)

1 - STROKE ADJUSTMENTS

2 - PILOT CHOKE ADJS.

3 - PILOT CHOKE & STROKE ADJS.

7 - STROKE ADJ. "A" END ONLY

8 - STROKE ADJ. "B" END ONLY

ELECTRICAL PLUG FEATURE (OMIT IF NOT REQUIRED)

PA - INSTA-PLUG, MALE RECEPTACLE ONLY

PB - INSTA-PLUG, MALE & FEMALE RECEPTACLE

PA3 (3 PIN) & PA5 (5 PIN) RECEPTABLES THAT MEET
NFPA HYDRAULIC VALVE ELECTRICAL STANDARD
T3.5.29M-1980.

For satisfactory service life of these components, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from Vickers OFF, OFR, and OFRS series are recommended.

Litho in U. S. A.

NAMEPLATE (REF.)

174638 SCREW (4 REQ'D) (REF.)
TORQUE TO 7-9 lb. in.
(0.8-1.0 N. m)

VALVE MODEL	MAIN STAGE SPOOL	PILOT VALVE MODEL	PILOT VALVE EXPLODED VIEW SHOWN ON:
DG5S4-10*A-W-*-53	0, 2, 6, 9, 33	DG4S4-012A-W-*-50	I-3557-S
DG5S4-10*B-W-*-53	0, 1, 2, 3, 6 9, 31, 33 4 & 8	DG4S4-016B-W-*-50	I-3558-S
DG5S4-10*C-W-*-53	0, 1, 2, 3, 6 9, 31, 33 4 & 8	DG4S4-0168B-W-*-50	
DG5S4-10*N-W-*-53	0, 2, 6, 9, 33	DG4S4-016C-W-*-50	
		DG4S4-0168C-W-*-50	I-3559-S

PILOT ATTACHING BOLTS (SEE TABLE)

' RING (5 REQ'D)
(NITRILE)

PLUG
' RING

■*363889 PLUG

▲263495 "O" RING

■*407533 PLUG

▲263493 "O" RING

▲263493 "O" RING (2 REQ'D)

■*407533 PLUG (2 REQ'D)

◇298168 SCREW
(4 REQ'D)
TORQUE TO
150-170 lb. ft.
(203.4-230.5 N. m)

276948 COVER

▲262409 "O" RING

280931 SPRING

107758 WASHER

REMOVE ON
SPRING OFFSET
MODELS ONLY

▲263493 "O" RING (2 REQ'D)

■*407533 PLUG (2 REQ'D)

■*"B" PLUG (SEE TABLE)

▲263495 "O" RING

■*363889 PLUG

195940 REST PIN (2 REQ'D)

▲154014 "O" RING (NITRILE)

▲263493 "O" RING

■*407533 PLUG

▲263494 "O" RING

■*343740 PLUG

▲154026 "O" RING (3 REQ'D
CHECK VALVE MODELS)
(4 REQ'D STD MODELS (NITRILE)
A, B, P & T PORTS)

◇▲154078 "O" RING (NITRILE)

NOTE
REFER TO PARTS DRAWING
I-3487-S FOR MODELS WITH
PLUG-IN FEATURES.

NOTE
SAE STRAIGHT THREAD PLUGS
USED ON EXTERIOR OF VALVE

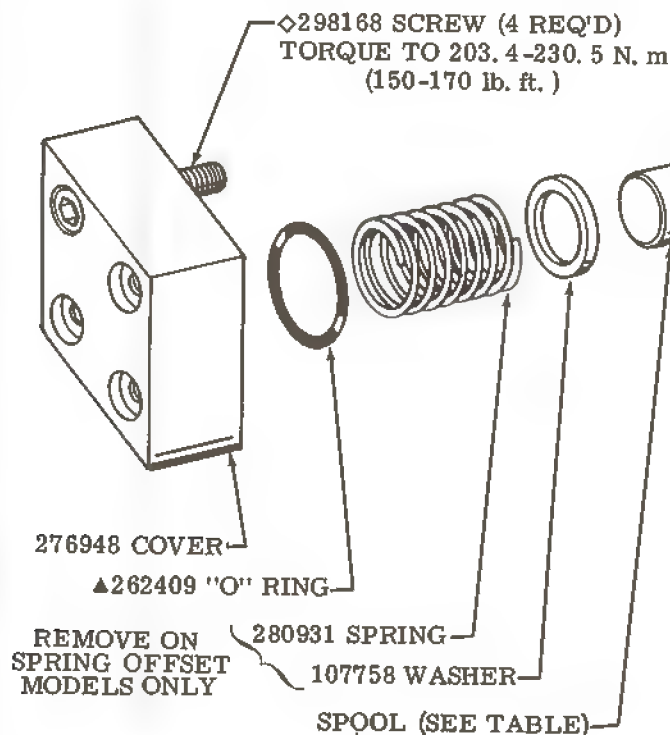
SEAL KIT NOTE

The -53 design valves are manufactured as shown with F3 seals used internally. Interface seals are standard Nitrile material and are converted to F3 in the seal kit. All seals in the seal kit are F3.

PLUG INSTALLATION TABLE				
MODEL		PLUG "A"	PLUG "B"	PLUG "C"
DG5S4-10**		DOES NOT EXIST	30560	OUT
DG5S4-10**-E			7074	30560
DG5S4-10**-X			OUT	OUT
DG5S4-10**-X-E				
DG5S4-10**-K/L/R/S		161809	7074	
DG5S4-10**-E-K/L/R/S		113000		30560
DG5S4-10**-X-K/L/R/S		OUT	OUT	
DG5S4-10**-X-E-K/L/R/S		113000		

VALVE MODEL CODE		SPOOL	MAIN STAGE ID PLATE W/ CIRCUIT DIAGRAM	
MODEL	VALVE TYPE		A	B, C, N
DG5S4-100-	A/B/C/N	364037	400975	400976
DG5S4-101-	B/C	*331404	—	400977
DG5S4-102-	A/B/C/N	364038	400975	400978
DG5S4-103-	B/C	*277479	—	400979
DG5S4-104-		281193	—	400980
DG5S4-106-	A/B/C/N	364039	400975	400981
DG5S4-108-	B/C	364041	—	400980
DG5S4-109-	A/B/C/N	277563	400975	400976
DG5S4-1031-	B/C	*277479	—	580475
DG5S4-1033-	A/B/C/N	364042	400975	400981

* ASSEMBLE TYPE 1 & 3 SPOOLS WITH NARROW CENTER LAND TOWARD "A" END OF VALVE. "A" END IS DEFINED AS BEING CLOSEST TO CYLINDER PORT "A". THE TYPE 31 SPOOL IS INSTALLED IN REVERSE OF TYPE "3", WITH NARROW CENTER LAND TOWARD "B" END.



PLUG TORQUES (OILED)		
PLUG	N. m	lb. in.
7074	8.5- 9.6	75-85
7075	20.0-23.0	180-205
30560	8.5- 9.6	75-85
113000	5.0- 5.9	45-52
161809	5.0- 5.9	45-52
343740	10.0-11.8	90-105
363889	16.9-18.0	150-160
407533	3.4- 4.0	30-35

THIS SOLENOID RE
ON "A" & "B" MO
(RIGHT HAND

PILOT ATTACHING PARTS		
MODEL	BOLT (4 REQ'D)	L'WASHER (4 REQ'D)
W/OUT PILOT CHOKE	□ 1034	□ 68907
W/PILOT CHOKE (SEE BACK PAGE)	Ø 10938	
TORQUE TO 100-112 lb. in. 11.3-12.65 N. m.		

416834 RIVET (4 REQ'D)

I.D. PLATE W/CIRCUIT
DIAGRAM (SEE TABLE)

*7074 PLUG (REMOVE
FOR INTERNAL PILOT
DRAIN "T" IN MODEL)

263493 "O" RING

*407533 PLUG

400959 BODY (STD)

435503 BODY (CHECK VLV)

*407533 PLUG

263493 "O" RING

*"C" PLUG (SEE TABLE)

154014 "O" RING (NITRILE)

*"A" PLUG (SEE TABLE)

263493 "O" RING

*407533 PLUG

245802 SLEEVE (PRESS IN PLA

MODEL	SPR
DG5S4-10**-K	24'
DG5S4-10**-L	24'
DG5S4-10**-R	27'
DG5S4-10**-S	43'

6422 PC

2891

- ▲▲ INCLUDED IN F3 SEAL KIT 920213
- ◇ INCLUDED IN FASTENER KIT 941262
- INCLUDED IN BOLT KIT 255633
- INCLUDED IN BOLT KIT 255654
- * INCLUDED IN PLUG KIT 941263
- PLUG TORQUES (SEE TABLE)
- ◆ NOT AVAILABLE FOR SALE
- ⊕ USED ON CHECK VALVE MODELS ONLY

NOTE
PARTS INCLUDED IN SERVICE KITS
WILL NOT BE SOLD SEPARATELY.

VICKERS®

A TRIMONA COMPANY

Service Parts Information

**Wet Armature
Pilot Operated
Solenoid
Controlled
Directional
Control Valves**

DG5S4-10*A-W(3)-*-53

DG5S4-10*B-W(3)-*-53

DG5S4-10*C-W(3)-*-53

DG5S4-10*N-W(3)-*-53



Vickers, Incorporated

1401 Crooks Road
Troy, Michigan 48064

Revised 11-1-85

I-3627-S

Litho in U. S. A.

267966 SCREW (4 REQ'D)
NAMEPLATE

COVER ATTACHING BOLTS	
MODEL	BOLT (4 REQ'D)
WITHOUT PILOT CHOKE	□ 1031
W/PILOT CHOKE (SEE BACK PAGE)	▧ 10935
(TORQUE TO 11.3 - 12.6 N. m) (100 - 112 lb. in.)	

■ PLUG TORQUES (OILED)		
PLUG	N. m	lb. in.
7074	8.5 - 9.6	75-85
30560		
113000	5.0 - 5.9	45-52
343740	10.0-11.8	90-105
363889	16.9-18.0	150-160
407533	3.4 - 4.0	30-35

with F3
Nitrile
ll seals

1 "O" RING
REQ'D)

074 PLUG

3 PLUG
RING

323656 COVER

■ * 363889 PLUG

▲ 263495 "O" RING

■ * 407533 PLUG

▲ 263493 "O" RING

▲ 263493 "O" RING
(2 REQ'D)

■ * 407533 PLUG
(2 REQ'D)

▲ 262409 "O" RING

276948 COVER

◇ 298168 SCREW
(4 REQ'D)
(TORQUE TO 203.4 -
230.5 N. m)
(150 - 170 lb. ft.)

280931 SPRING

107758 WASHER

REMOVE ON NO-SPRING
MODELS (BOTH ENDS
OF VALVE)

▲ 263493 "O" RING (2 REQ'D)

■ * 407533 PLUG (2 REQ'D)

■ * 7074 PLUG

▲ 263495 "O" RING

■ * 363889 PLUG

195940 REST PIN (2 REQ'D)

▲ 154014 "O" RING ("Y" PORT)(NITRILE)

▲ 263493 "O" RING

■ * 407533 PLUG

▲ 263494 "O" RING (2 REQ'D)

■ * 343740 PLUG (2 REQ'D)

▲ 154026 "O" RING(NITRILE)(3 REQ'D),
CHECK VALVE MODELS. 4 REQ'D,
STD MODELS A, B, P, & T PORTS)

▲ 154078 "O" RING (NITRILE)

"P" PORT

ALVE
2 SEAT

NOTE
PART NUMBERS INCLUDED
IN SERVICE KITS WILL NOT
BE SOLD SEPARATELY.

MODEL	SPOOL	IDENTIFICATION PLATE (W/CIRCUIT DIAGRAM)	
		SPRING CTR	NO-SPRING
DG3S4-100(C)(X)-*-53	364037	400976	400975
DG3S4-101C(X)-*-53	*331404	400977	—
DG3S4-102(C)(X)-*-53	364038	400978	400975
DG3S4-103C(X)-*-53	*277479	400979	—
DG3S4-104C(X)-*-53	281193	400980	—
DG3S4-106(C)(X)-*-53	364039	400981	400975
DG3S4-108C(X)-*-53	364041	400980	—
DG3S4-109(C)(X)-*-53	277563	400976	400975
DG3S4-1031C(X)-*-53	*277479	580475	—
DG3S4-1033C(X)-*-53	364042	400981	—

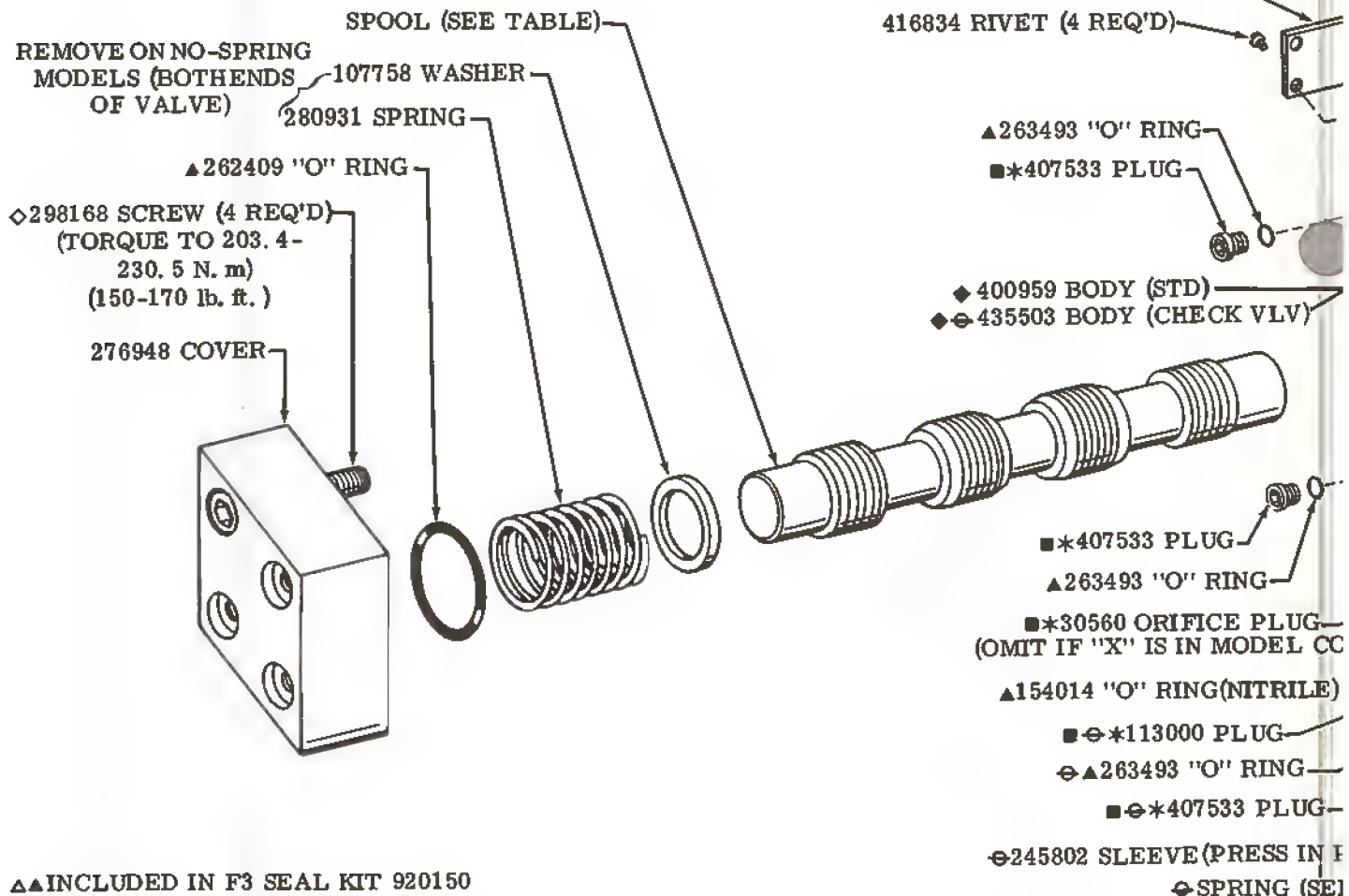
*SPOOL ASSEMBLY NOTE

Assemble type '1' and '3' spools with narrow center land toward "A" end of valve. "A" end of valve is defined as being closest to cylinder port "A". Type '31' spools are installed in reverse of type '3', with narrow center land toward "B" end of valve.

NOTE
SAE STRAIGHT THREAD PLUGS
USED ON EXTERIOR OF VALVE

SEAL KIT NOTE

The -53 design valves are manufactured as standard with F3 seals used internally. Interface seals are standard material and are converted to F3 in the seal kit. The seals in the seal kit are F3.



- ▲▲ INCLUDED IN F3 SEAL KIT 920150
- INCLUDED IN FASTENER KIT 941257
- ◇ INCLUDED IN FASTENER KIT 941262
- ≠ INCLUDED IN BOLT KIT 255620
- * INCLUDED IN PLUG KIT 941263
- INCLUDED IN COVER KIT 942024
- ◆ USED IN CHECK VALVE MODELS ONLY
- PLUG TORQUES (SEE TABLE)
- ◆ NOT AVAILABLE FOR SALE

MODEL	SPRING
DG3S4-10*(C)-K-53	◆247287
DG3S4-10*(C)-L-53	◆247288
DG3S4-10*(C)-R-53	◆276428
DG3S4-10*(C)-S-53	◆432353

VICKERS®

A TRIMONA COMPANY

Service Parts Information

**Pilot
Operated
Directional
Control
Valves**

DG3S4-10*C(X)-*-53
DG3S4-10*(X)-*-53



Vickers, Incorporated

1401 Crooks Road
Troy, Michigan 48064

Revised 11-1-85

I-3626-S

SEAL KIT NOTE

The -53 design valves are manufactured as shown with F3 seals used internally. Interface seals are standard Nitrile material and are converted to F3 in the seal kit. All seals in the seal kit are F3.

●174638 SCREW (4 REQ'D) TORQUE TO 7-9 lb. in. (0.8-1.0 N. m)

●IDENTIFICATION PLATE

A SP
IS US
"4" C

VOLTAGE	SOLENOID S/A			
	S/A COMPLETE		COIL	
	STD	F3	STD	F3
115AC60	281291	317767	316011	317768
230AC60	281292	317769	298721	317770
460AC60	281293	317771	298722	317772

FOR ADDITIONAL SOLENOID S/A'S
SEE I-3544-S

●36212 SCREW

●286122 WIRE & GASKET S/A

SCREW (SEE MAIN STAGE FOR FASTENER KIT)

LOCKWASHER (PART OF FASTENER KIT)

SOLENOID S/A (SEE TABLE)

236797 SNAP RING

281422 GUIDE

Δ262354 "O" RING

Δ262327 "O" RING

281423 WASHER

290072 SPRING

211846 WASHER

●7074 PLUG

Δ199811 "O" RING (5 REQ'D) (NITRILE)

211846 WASHER

290072 SPR

281423 W

Δ262327

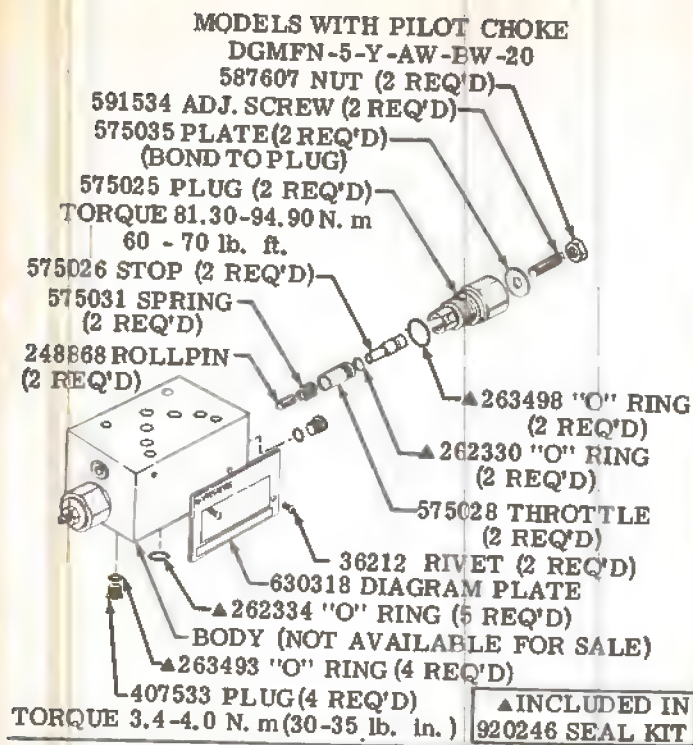
Δ26235

23

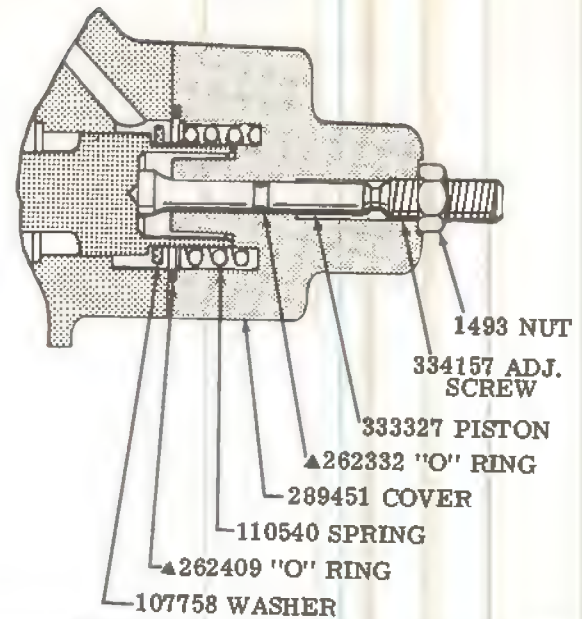
345825 SC
30-35 lb. f

●INCLUDED IN 941853 BODY S/A

ΔINCLUDED IN F3 PILOT VALVE SEAL KIT 919214.



STROKE ADJUSTMENT PARTS



MODEL CODE BREAKDOWN

(F3)-(P**) DG5S4(L)-10*D(*) (X)(**)-(E)-53

MULTI-FLUID
 CAPABILITY
 (VITON SEALS)

ELECTRICAL PLUG
 FEATURE (SEE
 NOTE BELOW)

DIRECTIONAL VALVE

SUBPLATE OR
 MANIFOLD MOUNTED

SOLENOID
 CONTROLLED
 PILOT
 OPERATED

SLIDING SPOOL

FLOW
 DIRECTIONS
 4 - 4 WAY

L - SOLENOID INDICATOR
 LIGHTS
 OMITTED - NONE

1.25 INCH SERIES 100

TYPE OF MAIN STAGE SPOOL

DESIGN

E - EXTERNAL PILOT PRESS.
 OMITTED - INTERNAL PILOT
 PRESSURE

SPOOL CONTROL MODIFICATION
 (OMIT WHEN NOT REQUIRED)

2 - PILOT CHOKE ADJUSTMENT
 8 - STROKE ADJ. CYLINDER "B"
 END ONLY
 2-8 - IF BOTH ARE REQUIRED

"X" - FAST RESPONSE MODEL
 (AVAILABLE ONLY FOR
 "A" PILOT PRESS RANGE)
 OMITTED - LOW SHOCK MODE

PILOT PRESSURE RANGE

A - 300-1000 PSI (20.7 - 70.0 bar)
 B - 1000-2000 PSI (70.0-138.0 bar)
 OMITTED - 2000-3000 PSI (138.0-207.0 bar)

PRESSURE CENTERED

ELECTRICAL PLUG FEATURE (OMIT IF NOT REQUIRED)

PA - INSTA-PLUG, MALE RECEPTACLE ONLY
 PB - INSTA-PLUG, MALE & FEMALE RECEPTACLE

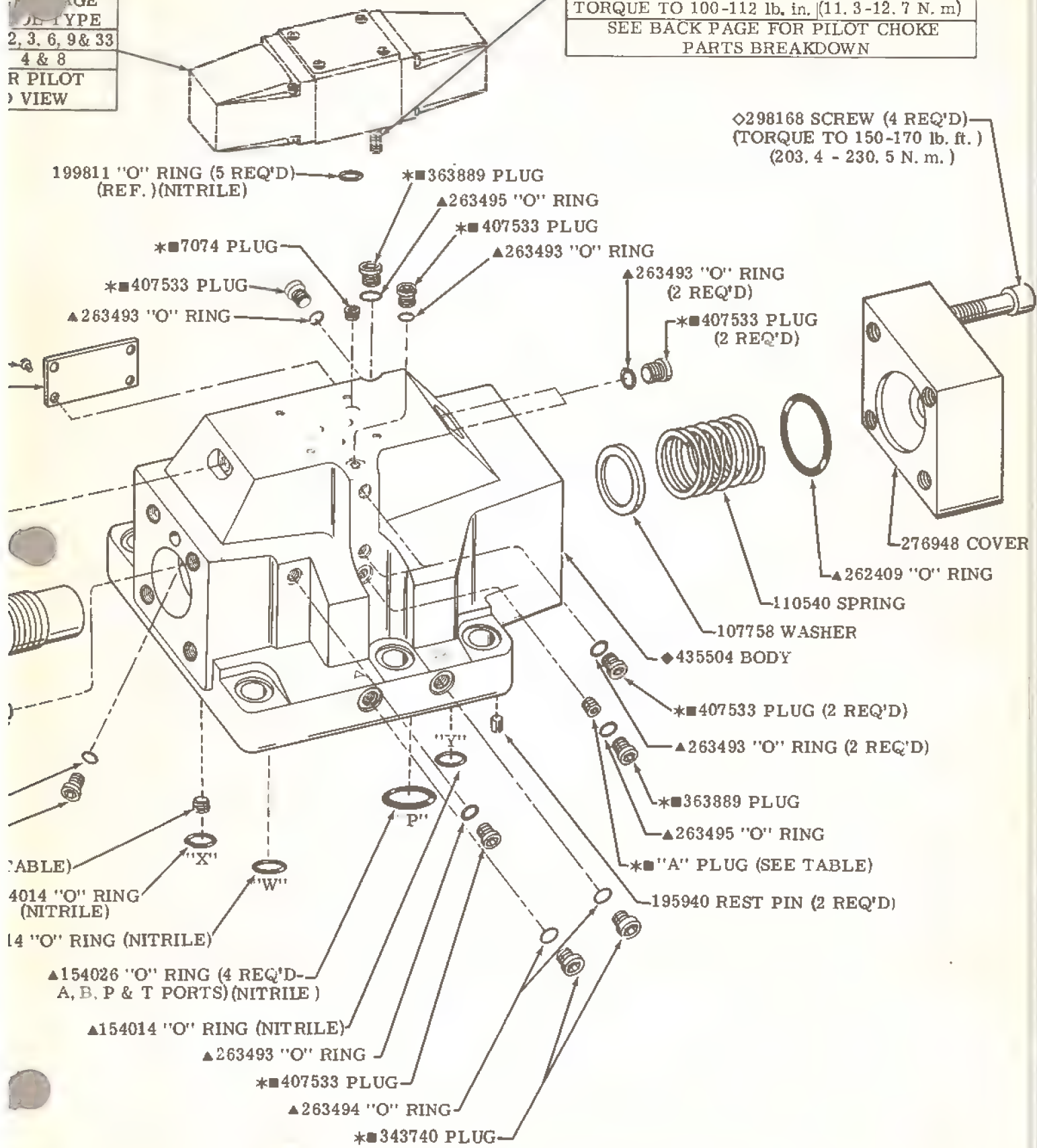
PA3 (3 PIN) & PA5 (5 PIN) RECEPTACLE THAT MEET
 NFPA HYDRAULIC VALVE ELECTRICAL STANDARD
 T3.5.29M-1980.

For satisfactory service life of these components in industrial applications, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from Vickers OFF, OFR, and OFRS series are recommended.

Litho in U. S. A.

PAGE
 TYPE
 2, 3, 6, 9 & 33
 4 & 8
 R PILOT
 VIEW

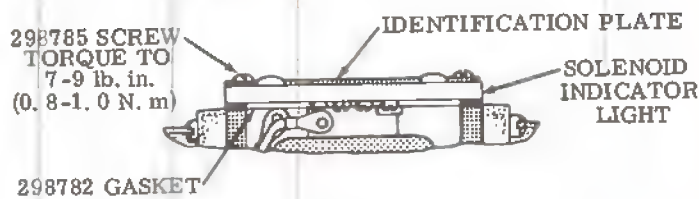
PILOT ATTACHING PARTS		
BOLT (4 REQ'D)	L'WASHER (4 REQ'D)	MODEL
1034	68907	W/OUT PILOT CHOKE
10938		WITH PILOT CHOKE
TORQUE TO 100-112 lb. in. (11.3-12.7 N. m)		
SEE BACK PAGE FOR PILOT CHOKE PARTS BREAKDOWN		



3484-01*C*-50 PILOT VALVE		
SPOOL		DIAGRAM
TYPE	PART	PLATE
7	236624	290346
78		577482

NOTE
DESIGNATION OF (78) INDICATES VALVE
IS A PILOT FOR TWO STAGE VALVES WITH
"7" TYPE MAIN STAGE SPOOLS.

FOR MODELS WITH
SOLENOID INDICATOR LIGHTS



SOLENOID INDICATOR LIGHT KIT (INCLUDES ALL PARTS IDENTIFIED)	
VOLTAGE RANGE	KIT
100 thru 127	941615
192 thru 233	941617

NOTE
REFER TO PARTS DRAWING
I-3487-S FOR MODELS WITH
PLUG-IN FEATURE.

416834 RIVET (4 REQ'D)

DIAGRAM PLATE (SEE TABLE)

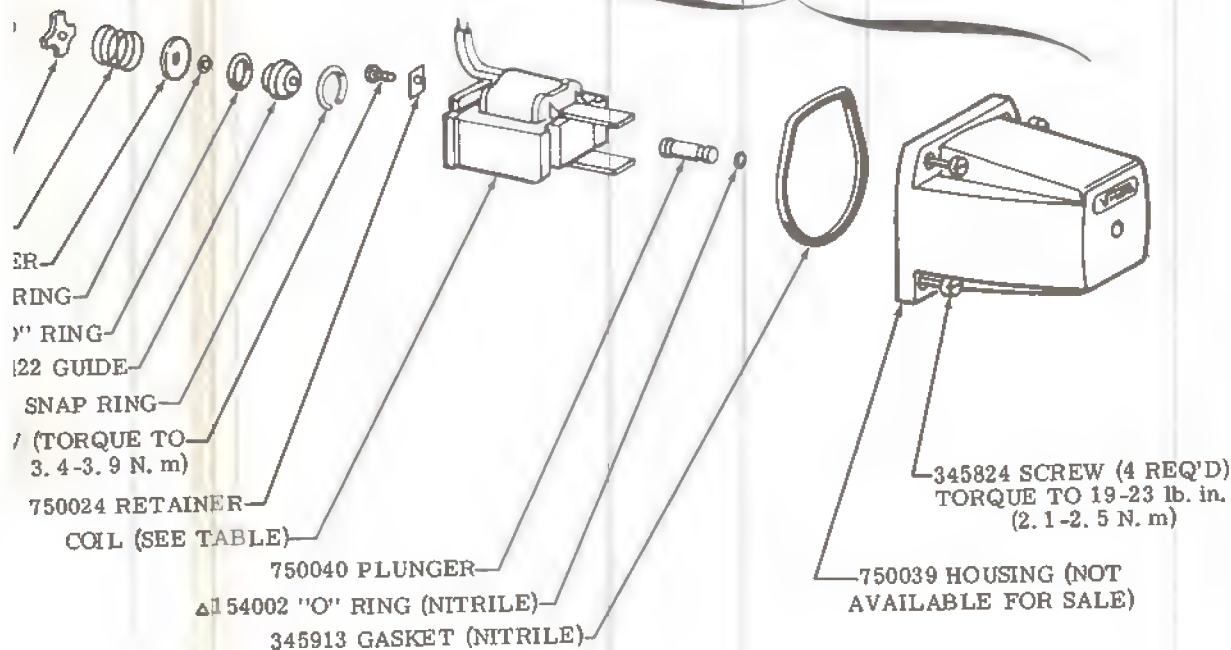
1/8"

SOLENOID S/A

SOLENOID (SEE TABLE)

213168 PUSH PIN (2 REQ'D)

INCLUDED IN STD. SOLENOID
S/A. USE "F3" SOLENOID S/A
FOR "F3" APPLICATIONS.



MODEL	SPOOL	ID PLATE W CIRCUIT DIAG.
DG5S4-100D-53	364037	400967
DG5S4-101D-53	*331404	400968
DG5S4-102D-53	364038	400969
DG5S4-103D-53	*277479	400970
DG5S4-104D-53	281193	400971
DG5S4-105D-53	364039	400972
DG5S4-108D-53	364041	400971
DG5S4-109D-53	277563	400967
DG5S4-1033D-53	364042	400972

***NOTE**

ASSEMBLE TYPE 1 AND 3 SPOOLS WITH NARROW CENTER LAND TOWARD "A" END OF VALVE. "A" END OF VALVE IS DEFINED AS BEING CLOSEST TO CYLINDER PORT "A".

*PLUG INSTALLATION TABLE		
MODEL	"A" PLUG	"B" PLUG
-10*D-53	226987	OUT
-10*D-E-53	7074	226987
-10*DA-53	30560	OUT
-10*DA-E-53	7074	30560
-10*DAX-53	OUT	OUT
-10*DAX-E-53	7074	
-10*DB-53	224026	
-10*DB-E-53	7074	224026
7074 IS AN NPTF PIPE PLUG. OTHERS ARE NPTF OFFICE PLUGS.		

PILOT MODEL

DG4S4-017C-*-50	(
DG4S4-0178C-*-50)
SEE BACK PAGE VALVE EXPLO	

■ PLUG TORQUES (OILED)

PLUG	N. m.	lb. in.
7074	8.5 - 9.6	75-85
7075	20.0 - 23.0	180-205
30560	8.5 - 9.6	75-85
224026	8.5 - 9.6	75-85
226987	8.5 - 9.6	75-85
343740	10.0 - 11.8	90-105
363889	16.9 - 18.0	150-160
407533	3.4 - 4.0	30-35

SEAL KIT NOTE

The -53 design valves are manufactured as shown with F3 seals used internally. Interface seals are standard Nitrile material and are converted to F3 in the seal kit. All seals in the seal kit are F3.

415834 RIVET (4 REQ'D)

ID PLATE W/ CIRCUIT
DIAGRAM (SEE TABLE)

▲263493 "O" RING

*■407533 PLUG

*■407533 PLUG

▲263493 "O" RING

◇208175 SCREW (4 REQ'D)
(TORQUE TO 150-170 lb. ft.
203.4 - 230.5 N. m.)

431403 COVER

▲262333 "O" RING

SPOOL (SEE TABLE)

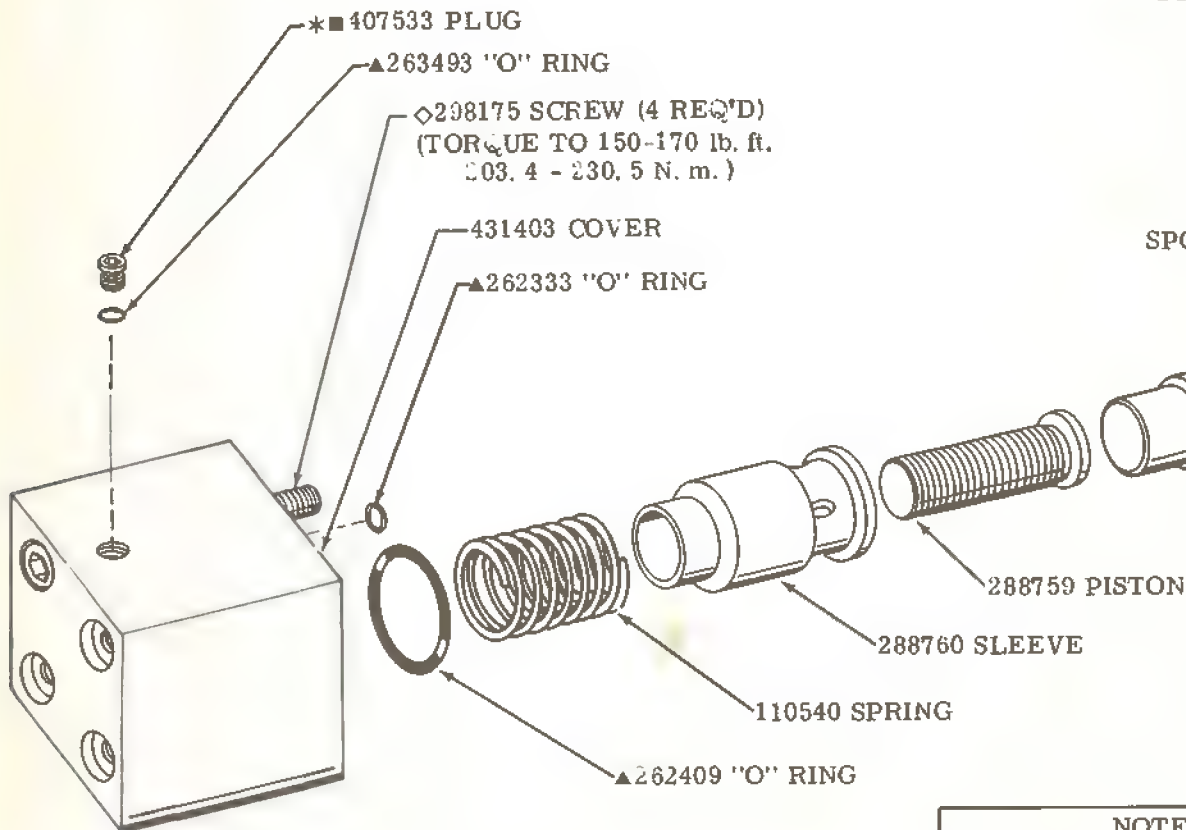
*■407533 PLUG

▲263493 "O" RING

▲263493 "O" RING

*■407533 PLUG

*■"B" PLUG (S)



NOTE
SAE STRAIGHT THREAD PLUGS
USED ON EXTERIOR OF VALVE

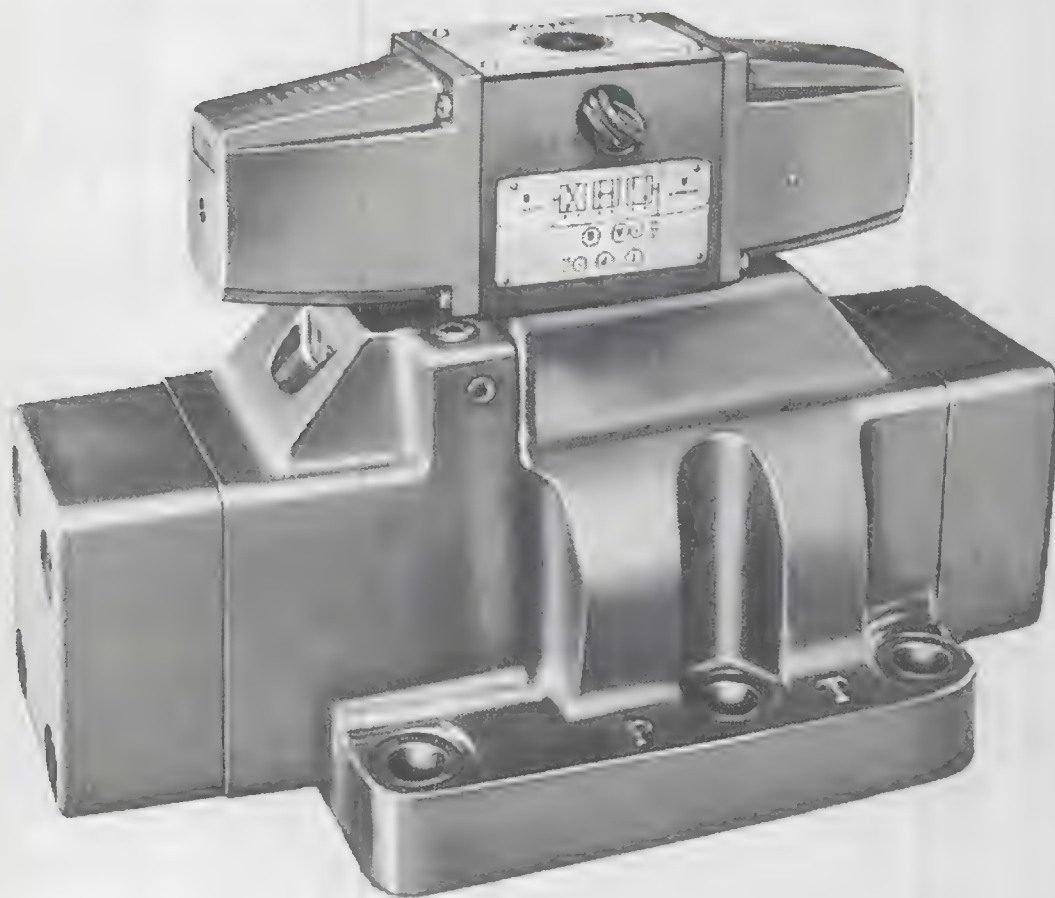
NOTE
PARTS INCLUDED IN SERVICE
KITS NOT SOLD SEPARATELY

- ▲▲ INCLUDED IN F3 SEAL KIT 920213
- * INCLUDED IN PLUG KIT 941263
- ◇ INCLUDED IN FASTENER KIT 941273
- INCLUDED IN BOLT KIT 255633
- INCLUDED IN BOLT KIT 255654
- PLUG TORQUES SEE TABLE
- ◆ NOT AVAILABLE FOR SALE

Service Parts Information

**Air Gap
Solenoid Controlled
Pilot Operated
Directional
Control Valves**

DG5S4(L)-10*D(X)-*-53

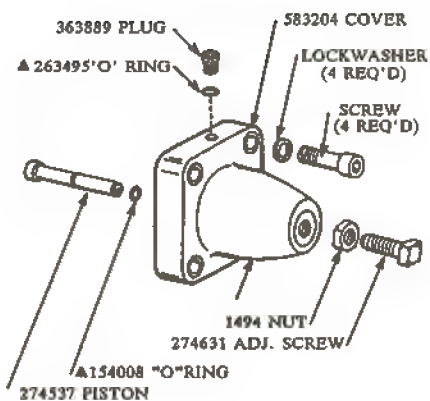
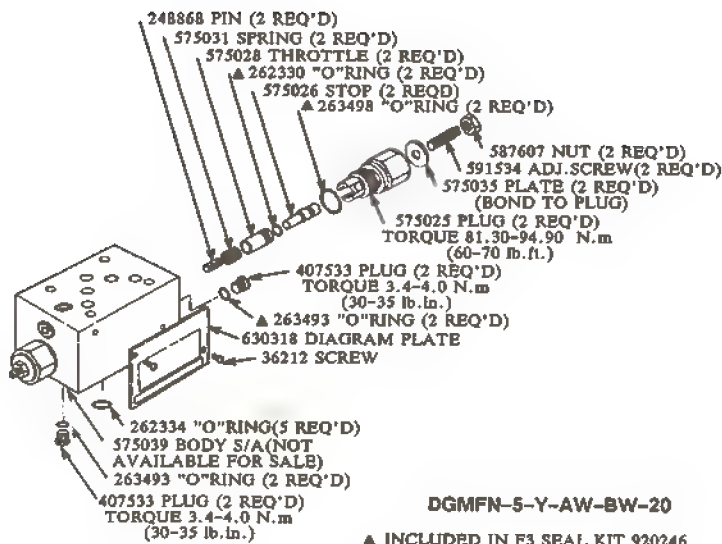


Vickers, Incorporated

1401 Crooks Road
Troy, Michigan 48084

Revised 9-1-86

I-3625-S



STROKE ADJUSTMENT OPTION

MODEL CODE BREAKDOWN

(F3)(P**) DF5S 4(L) -16 ** -*(E)-W(3)-*-53

MULTI-FLUID
 CAPABILITY
 (VITON SEALS)

ELECTRICAL PLUG
 FEATURE (SEE
 NOTE BELOW)

DIRECTIONAL VALVE

FLANGE CONNECTION

SOLENOID CONTROLLED
 PILOT OPERATED

SLIDING SPOOL

FLOW DIRECTIONS
 4 - 4 WAY

L - SOLENOID INDICATOR
 LIGHTS
 OMITTED - NONE

VALVE SIZE
 160 SERIES
 (2 INCH)

TYPE OF MAIN STAGE SPOOL

DESIGN

COIL
 IDENTIFICATION
 LETTER

W - NON-SERVICEABLE
 CORE TUBE IN PILOT
 W3 - SERVICEABLE CORE
 TUBE IN PILOT

E - EXTERNAL PILOT PRESSURE
 OMITTED - INTERNAL PILOT PRESS

SPOOL CONTROL MODIFICATIONS
 (OMIT IF NOT REQ'D)

1 - STROKE ADJUSTMENTS
 2 - PILOT CHOKE
 3 - PILOT CHOKE & STROKE ADJ
 7 - STROKE ADJ. "A" END ONLY
 8 - STROKE ADJ. "B" END ONLY

VALVE TYPE
 A - SPRING OFFSET
 B - SPRING CENTERED
 (ONE SOLENOID)
 C - SPRING CENTERED
 N - DETENTED

ELECTRICAL PLUG FEATURE (OMIT IF NOT REQUIRED)

PA - INSTA-PLUG, MALE RECEPTACLE ONLY
 PB - INSTA-PLUG, MALE & FEMALE RECEPTACLE

PA3 (3 PIN) & PA5 (5 PIN) RECEPTACLES THAT
 MEET NFPA HYDRAULIC VALVE ELECTRICAL
 STANDARD T3. 5, 29M-1980.

For satisfactory service life of these components in industrial applications, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from Vickers OFF, OFR, and OFRS series are recommended.

Litho in U. S. A.

PLUG THIS OPENING WITH A 15932 PLUG & 263496 "O" RING NINTERNAL PILOT PRESSURE MODELS, "E" OMITTED FROM MODEL CODE.

BOLT KIT
(SEE TABLE)

VALVE MODEL CODE	MAIN STAGE SPOOL TYPE	PILOT VALVE MODEL CODE	PARTSDWG. SEE NOTE
DF5S4-16*A-*-53	0, 2, 6, 9, 33	DG4S4-012A-W-*-50-S344	I-3557-S
DF5S4-16*B-*-53	0, 1, 2, 3, 6, 9, 31, 33	DG4S4-016B-W-*-50-S344	I-3558-S
	4 & 8	DG4S4-0168B-W-*-50-S344	
DF5S4-16*C-*-53	0, 1, 2, 3, 6, 9, 31, 33	DG4S4-016C-W-*-50-S344	
	4 & 8	DG4S4-0168C-W-*-50-S344	
DF5S4-16*N-*-53	0, 2, 6, 9, 33	DG4S4-012N-W-*-51-S344	I-3559-S
NOTE			
THE -S344 PILOT VALVE IS THE SAME AS THE VALVE SHOWN ON THE TABULATED PARTSDRAWING EXCEPT: 434286 BODY REPLACES 400817 BODY. 407533 PLUG & 263493 "O" RING ARE OMITTED.			

113000 PLUG
FOR EXTERNAL PILOT
PRESSURE MODELS
DF5S4(L)-16**-E-

416834 RIVET (4 REQ'D)

MAIN STAGE ID PLATE
(SEE TABLE)

583197 BODY (NOT
AVAILABLE FOR SALE)

173792 "O" RING

SPOOL (SEE TABLE)

107755 WASHER

OMIT ON "A" SPRING
OFFSET MODELS

279241 SPRING

154089 "O" RING

583203 COVER

68913 LOCKWASHER
(4 REQ'D)

298187 SCREW (4 REQ'D)
TORQUE TO 488-596, 5 N. m
(360-440 lb. ft.)

1 INCLUDED IN SEAL KIT 919405
F3 EQUIVALENT SEAL KIT 919434
2 PLUG TORQUES (SEE TABLE)

VALVE MODEL CODE		SPOOL	MAIN STAGE ID PLATE W/CIRCUIT DIAGRAM	
MAIN STAGE	VALVE TYPE		"A" ONLY	B/C/N
DF5S4-160-	A/B/C/N	273677	400975	400976
DF5S4-161-	B/C	*386581		400977
DF5S4-162-	A/B/C/N	273676		400978
DF5S4-163-	B/C	*275803		400979
DF5S4-164-	B/C	*273720		400980
DF5S4-166-	A/B/C/N	275804		400981
DF5S4-168-	B/C	*275805		400980
DF5S4-169-	A/B/C/N	275806		400976
DF5S4-1631-	B/C	*275803		580475
DF5S4-1633-	A/B/C/N	317777		400981
*SEE SPOOL ASSEMBLY VIEW				

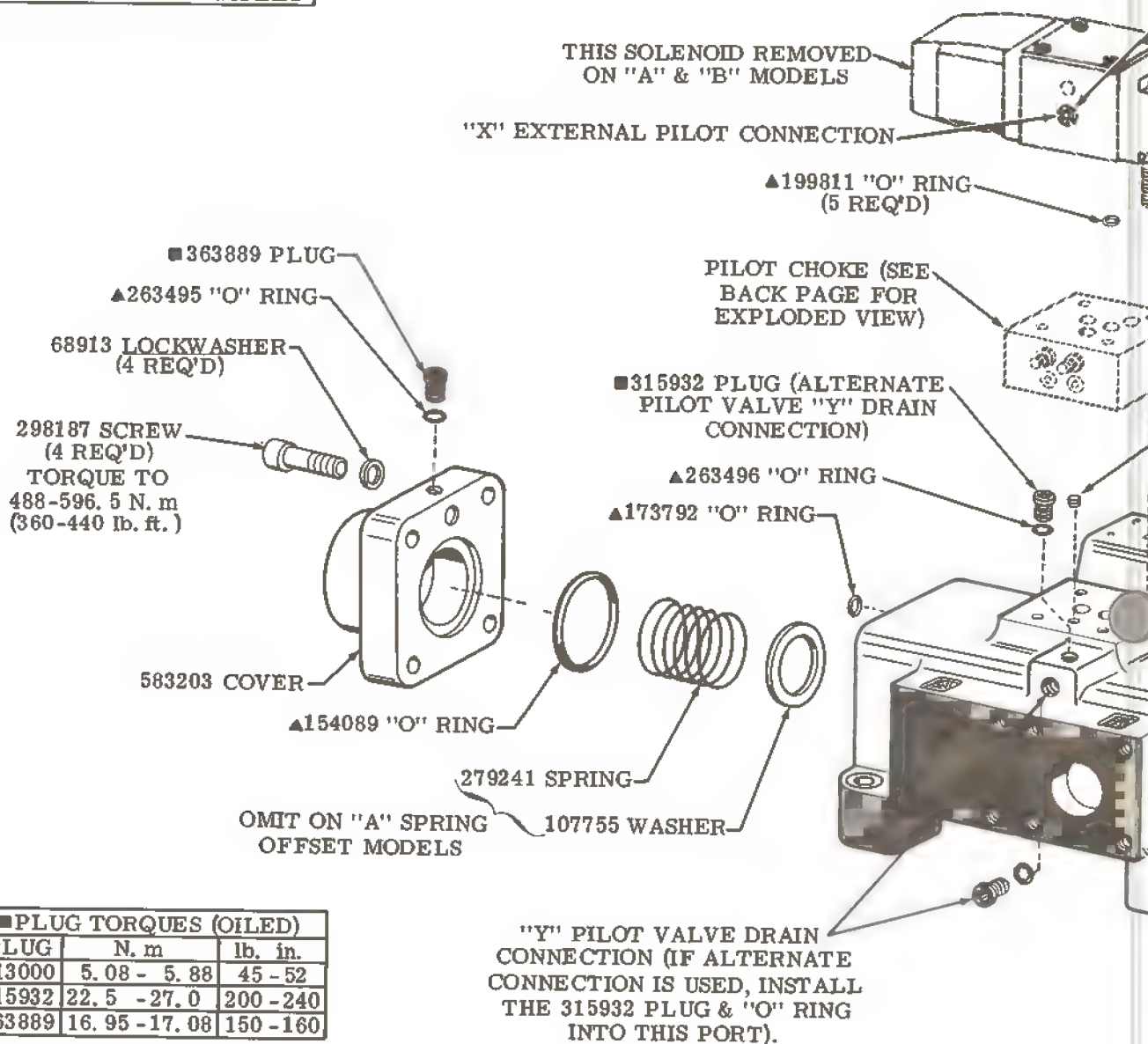
363889 PLUG

263495 "O" RING

NOTE
SEE MODEL CODE PAGE FOR
SOLENOID INDICATOR LIGHT
PARTS

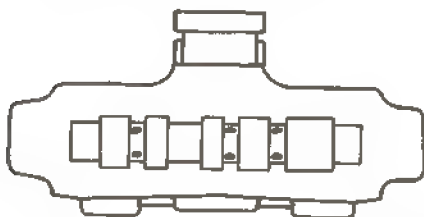
NOTE
PARTS INCLUDED IN SERVICE
KITS NOT SOLD SEPARATELY

PILOT ATTACHING PARTS	
MODEL	BOLT KIT
W/OUT PILOT CHOKE	255633
WITH PILOT CHOKE	255654
TORQUE TO 11.3 - 12.65 N.m (100 - 112 lb.in.)	

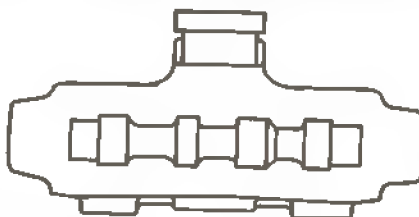


■PLUG TORQUES (OILED)		
PLUG	N. m	lb. in.
113000	5.08 - 5.88	45 - 52
315932	22.5 - 27.0	200 - 240
363889	16.95 - 17.08	150 - 160

ASSEMBLE TYPE 4 & 8 SPOOLS
WITH WIDE UNDERCUT
TOWARD "A" END



ASSEMBLE TYPE 1 & 3 SPOOLS
WITH TAPER TOWARD "B" END.
TYPE 31 SPOOL IS ASSEMBLED
WITH TAPER TOWARD "A" END.



SPOOL ASSEMBLY

Service Parts Information

**Wet Armature
Solenoid
Controlled
Pilot Operated
Directional
Valves**

DF5S4-16*A-*- (E)-W(3)-*-53
DF5S4-16*B-*- (E)-W(3)-*-53
DF5S4-16*C-*- (E)-W(3)-*-53
DF5S4-16*N-*- (E)-W(3)-*-53



Vickers, Incorporated

1401 Crooks Road
Troy, Michigan 48064

Revised 12-1-87

I-3623-S

SCREW (SEE TABLE)

WASHER (SEE TABLE)

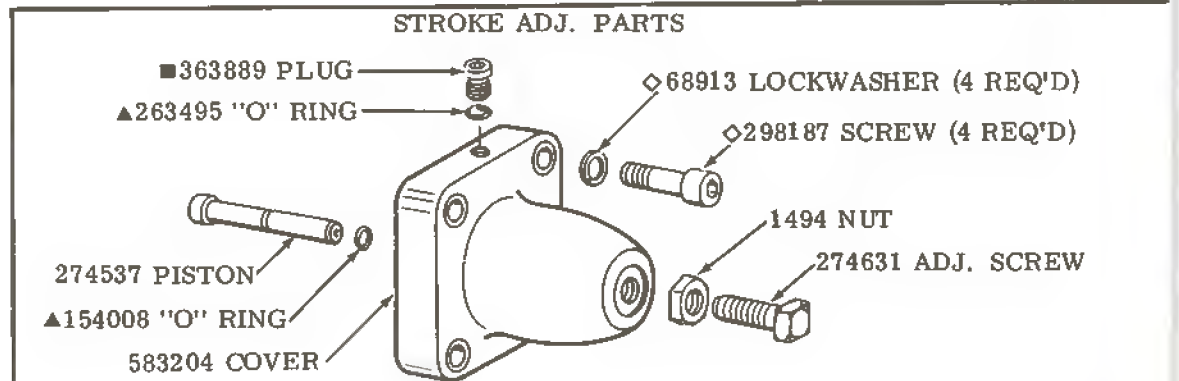
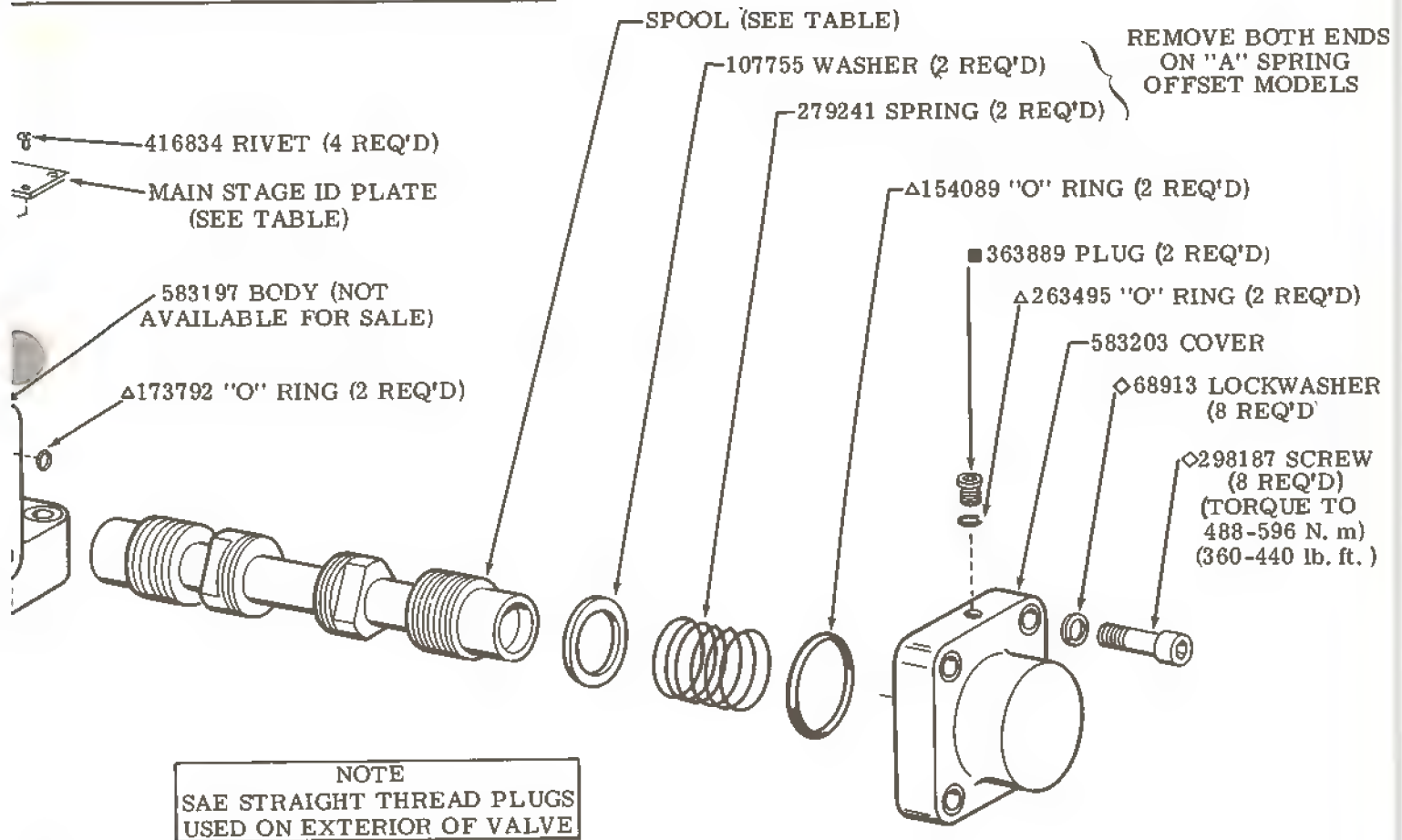
PILOT ATTACHING PARTS

MODEL	SCREW (4 REQ'D)	WASHER (4 REQ'D)
W/OUT PILOT CHOKE	□ 1034	□ 68907
WITH PILOT CHOKE	▧ 10938	▧ 68907

TORQUE TO 100-112 lb. in. (11.3-12.7 N. m),
SEE OTHER PAGE FOR PILOT CHOKE PARTS

VALVE MODEL CODE		SPOOL	MAIN STAGE ID PLATE W/CIRCUIT DIAGRAM	
MODEL	VALVE TYPE		"A" ONLY	B/C/N
DF5S4-160-	A/B/C/N	273677	400975	400976
DF5S4-161-	B/C	*386581		400977
DF5S4-162-	A/B/C/N	273676		400978
DF5S4-163-	B/C	*275803		400979
DF5S4-164-		*273720		400980
DF5S4-166-	A/B/C/N	275804		400981
DF5S4-168-	B/C	*275805		400980
DF5S4-169-	A/B/C/N	275806		400976
DF5S4-1631-	B/C	*275803		580475
DF5S4-1633-	A/B/C/N	317777		400981

* SEE SPOOL ASSEMBLY NOTE



NOTE
FOR SINGLE SOLENOID MODELS RIGHT HAND ASSEMBLY SHOWN. FOR LEFT HAND ASSEMBLY ALL PARTS ARE REVERSED, EXCEPT BODY & SPOOL.
Ex. LH MODEL: DG4S4-01**-5*-S344-LH

NOTE
A SPOOL DESIGNATION OF (68B) INDICATES VALVE IS ASSEMBLED "LH" & IS USED AS A PILOT FOR TWO STAGE VALVES WITH "4" OR "8" TYPE MAIN STAGE SPOOLS.

SPOOL		DIAGRAM PLATE			
		"A"		"B" & "C"	"N"
TYPE	PART	LH	RH		
2	213131	577490	290348		577486
6	213232			290345	
68				577480	

298785 SCREW (TORQUE TO 7-9 lb. in, 0.8-1.0 N. m)
SOLENOID INDICATOR LIGHT IDENTIFICATION PLATE
298782 GASKET



SOLENOID INDICATOR LIGHT KIT (INCLUDES ALL PARTS IDENTIFIED)	
VOLTAGE RANGE	KIT
100 thru 127	941615
192 thru 233	941617

FOR MODELS WITH SOLENOID INDICATOR LIGHTS

DIAGRAM PLATE (SEE TABLE)
416834 RIVET (4 REQ'D)

SCREW (SEE MAIN STAGE FOR FASTENER KIT)

LOCKWASHER (PART OF FASTENER KIT)

64765 PLUG

431945 BODY

SPOOL (SEE TABLE)

213268 PUSH PIN

"X" - EXTERNAL PILOT PRESSURE CONNECTION

211846 WASHER (OMIT ON "A" MODELS)

INCLUDED IN STD. SOLENOID S/A
USE "F3" SOLENOID S/A FOR "F3" APPLICATIONS

237976 SPRING FOR "A" MODELS ONLY
290072 SPRING USED ON ALL MODELS EXCEPT "A"

281547 SPACER ("A" MODELS OMIT ON "B" & "C")

281423 WASHER

Δ262327 "O" RING

Δ262354 "O" RING

281422 GUIDE

236797 SNAP RING

345825 SCREW (TORQUE 30-35 lb. in. 3.4-3.9 N. m)

750024 RETAINER COIL (SEE TABLE)

237976 SPRING

*ROLLPIN

*RETAINING RING

*DETENT PIN (2 REQ'D)

*DETENT RETAINER

Δ262327 "O" RING

Δ262354 "O" RING

281422 GUIDE

236797 SNAP RING

SOLENOID S/A (SEE TABLE)

USE ON "N" DETENT MODELS

345824 SCREW (4 REQ'D)
TORQUE TO 19-23 lb. in. (2.1-2.5 N. m)

750039 HOUSING (NOT AVAILABLE FOR SALE)

Δ345913 GASKET (NITRILE)

Δ154002 "O" RING (NITRILE)

750040 PLUNGER

USE ON "A", "B", & "C" MODELS

LUDED IN F3 VALVE SEAL 214

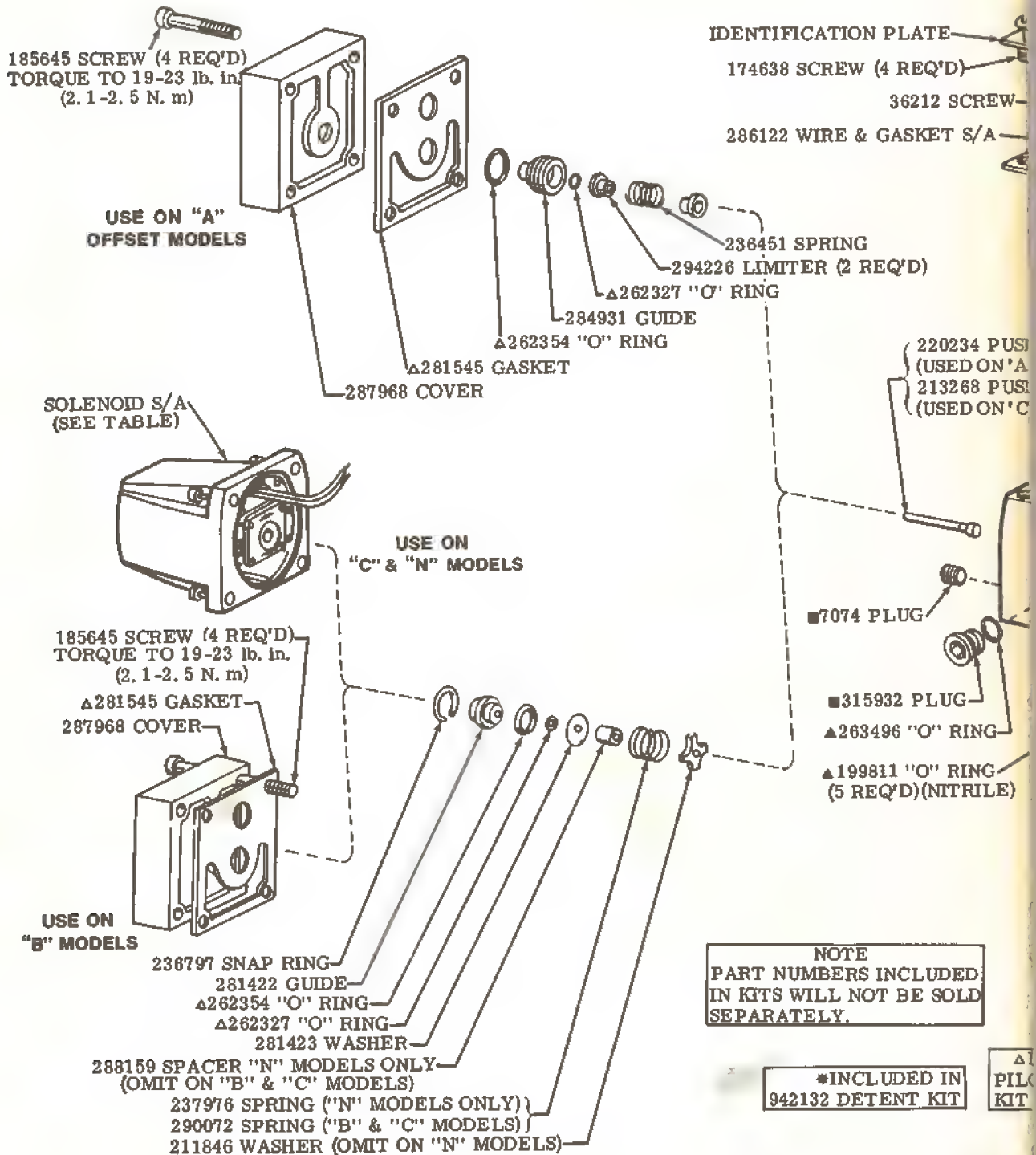
VOLTAGE	SOLENOID S/A			
	S/A COMPLETE		COIL	
	STD	F3	STD	F3
115AC60	281291	317767	316011	317768
230AC60	281292	317769	298721	317770
460AC60	281293	317771	298722	317772
FOR ADDITIONAL SOLENOID S/A'S SEE I-3544-S				

SEAL KIT NOTE

The -53 design pilot valves are manufactured as shown with F3 seals used internally. Interface seals are standard Nitrile material and are converted to F3 in the seal kit. All seals in the pilot valve seal kit are F3.

NOTE

REFER TO PARTS DRAWING I-3487-S FOR MODELS WITH PLUG-IN FEATURE.



PILOT CHOKE

DGMFN-5-Y-AW-BW-20

575025 PLUG (2 REQ'D)
TORQUE 81.30 - 94.90 N.m
(60 - 70 lb. ft.)

575031 SPRING (2 REQ'D)

248868 ROLLPIN (2 REQ'D)

BODY (NOT AVAILABLE
FOR SALE)

587607 NUT (2 REQ'D)

591534 ADJ. SCREW (2 REQ'D)

575035 PLATE (2 REQ'D)
(BOND TO PLUG)

▲263498 "O" RING (2 REQ'D)

575026 STOP (2 REQ'D)

▲262330 "O" RING (2 REQ'D)

575028 THROTTLE (2 REQ'D)

407533 PLUG (4 REQ'D)
TORQUE 3.4 - 4.0 N.m
(30 - 35 lb. in.)

▲263493 "O" RING (4 REQ'D)

630318 DIAGRAM PLATE

36212 RIVET (2 REQ'D)

▲262334 "O" RING (5 REQ'D)

▲INCLUDED IN
920246 SEAL KIT

MODEL CODE BREAKDOWN

(F3)-DF5S4(L)-16**-*(*)-(E)-(***AC***)-53

MULTI-FLUID
CAPABILITY
(VITON SEALS)

DIRECTIONAL
VALVE

FLANGE
CONNECTION

SOLENOID CONTROLLED
PILOT OPERATED

SLIDING SPOOL

FLOW DIRECTIONS
4 - 4 WAY

L - SOLENOID INDICATOR
LIGHT
OMITTED - NONE

SERIES 160

DESIGN

VOLTAGE AND FREQUENCY
OMITTED - 115AC60 STD.

OMITTED - INTERNAL PILOT PRESSURE
E - EXTERNAL PILOT PRESSURE

SPOOL CONTROL MODIFICATIONS
(OMIT IF NOT REQUIRED)

- 1 - STROKE ADJUSTMENTS
- 2 - PILOT CHOKE
- 3 - PILOT CHOKE & STROKE ADJ.
- 7 - STROKE ADJ. "A" END ONLY
- 8 - STROKE ADJ. "B" END ONLY

A - SPRING OFFSET
B - SPRING CENTERED
SINGLE SOLENOID
C - SPRING CENTERED
N - DETENT

TYPE OF MAIN STAGE SPOOL

ELECTRICAL PLUG FEATURE (OMIT IF NOT REQUIRED)

PA - INSTA-PLUG, MALE RECEPTACLE ONLY
PB - INSTA-PLUG, MALE & FEMALE RECEPTORS

PA3 (3 PIN) & PA5 (5 PIN) RECEPTACLES THAT MEET
NFPA HYDRAULIC VALVE ELECTRICAL STANDARD
T3.5.29M-1980.

For satisfactory service life of these components, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from Vickers OFP, OFR, and OFRS series are recommended.

Litho in U. S. A.

NOTE
SEE BACK PAGE FOR
SOLENOID INDICATOR LIGHTS

VALVE MODEL	MAIN STAGE SPOOL TYPE	PILOT VALVE MODEL CODE (SEE BACK PAGE)
DF5S4-16*A-*-53	0, 2, 6, 9, 33	DG4S4-012A-*-50-S344
DF5S4-16*B-*-53	0, 1, 2, 3, 6	DG4S4-016B-*-50-S344
	9, 31, 33	DG4S4-0168B-*-50-S344
DF5S4-16*C-*-53	4 & 8	DG4S4-016C-*-50-S344
	0, 1, 2, 3, 6	DG4S4-016C-*-50-S344
	9, 31, 33	DG4S4-0168C-*-50-S344
DF5S4-16*N-*-53	4 & 8	DG4S4-0168C-*-50-S344
	0, 2, 6, 9, 33	DG4S4-012N-*-51-S344

NAMEPLATE (REF.)

GASKET (REF.)

THIS SOLENOID IS
REMOVED ON "A"
& "B" MODELS

Δ199811 "O" RING
(REF)(5 REQ'D)

PILOT CHOKE LOCATION
(SEE MODEL CODE PAGE)

■113000 PLUG
FOR EXTERNAL PILOT PRESSURE
MODELS. REMOVE FOR INTERNAL
PILOT PRESSURE.

315932 PLUG(ALTERNATE
PILOT VALVE "Y" DRAIN)

Δ263496 "O" RING

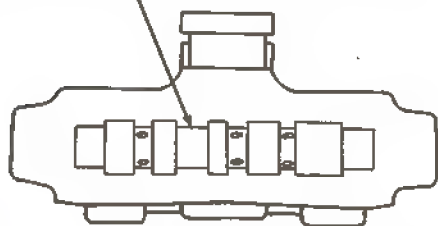
SEE OTHER END OF VALVE
FOR PART NUMBERS

■PLUG TORQUES (OILED)		
PLUG	N. m	lb. in.
7074	8.5 - 9.6	75-85
7075	20.0-23.0	180-205
113000	5.0 - 5.9	45-52
315932	22.5-27.0	200-240
363889	16.9-18.0	150-160

"Y"-PILOT VALVE DRAIN
CONNECTION. IF ALTERNATE
CONNECTION IS USED
INSTALL THE 315932 PLUG &
"O"RING INTO THIS PORT

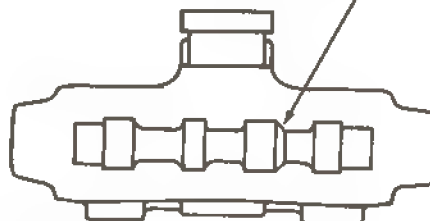
NOTE
PART NUMBERS INCL
IN KITS WILL NOT BE
SEPARATELY.

ASSEMBLE TYPE 4 & 8 SPOOLS WITH
WIDE UNDERCUT TOWARD "A" END
"A" END OF VALVE IS DEFINED AS
BEING CLOSEST TO CYLINDER
PORT "A"



*SPOOL ASSEMBLY

ASSEMBLE TYPE 1 & 3 SPOOLS WITH
TAPER TOWARD "B" END. TYPE 31
SPOOL IS ASSEMBLED WITH TAPER
TOWARD "A" END.



▲▲INCLUDED IN SEAL KIT &
F3 EQUIVALENT SEAL KIT
□ INCLUDED IN BOLT KIT
■ INCLUDED IN BOLT KIT
◇ INCLUDED IN FASTENER
■ PLUG TORQUES (SEE TABLE)

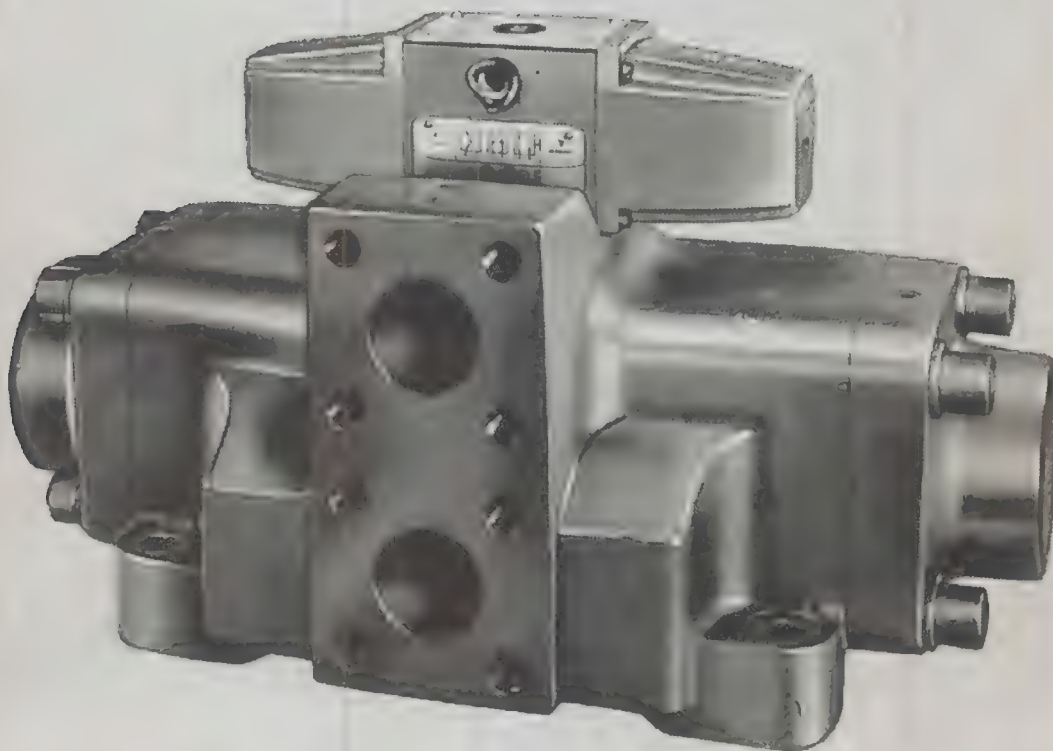
VICKERS

A TRINOMA COMPANY

**S r
nf r**

**Air Gap
Solenoid Controlled
Pilot Operated
Directional
Control Valves**

DF5S4(L)-16*A-(*)-(E)-53
DF5S4(L)-16*B-(*)-(E)-53
DF5S4(L)-16*C-(*)-(E)-53
DF5S4(L)-16*N-(*)-(E)-53



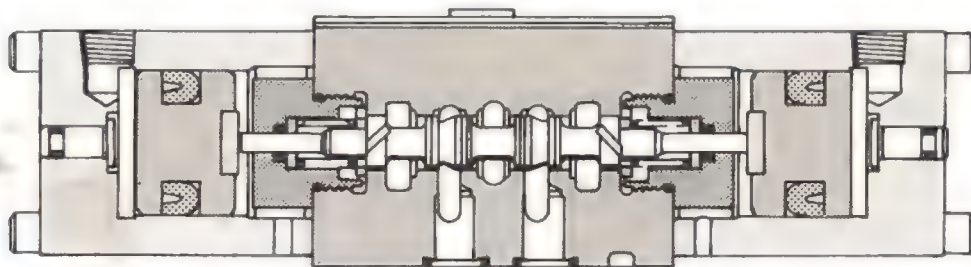
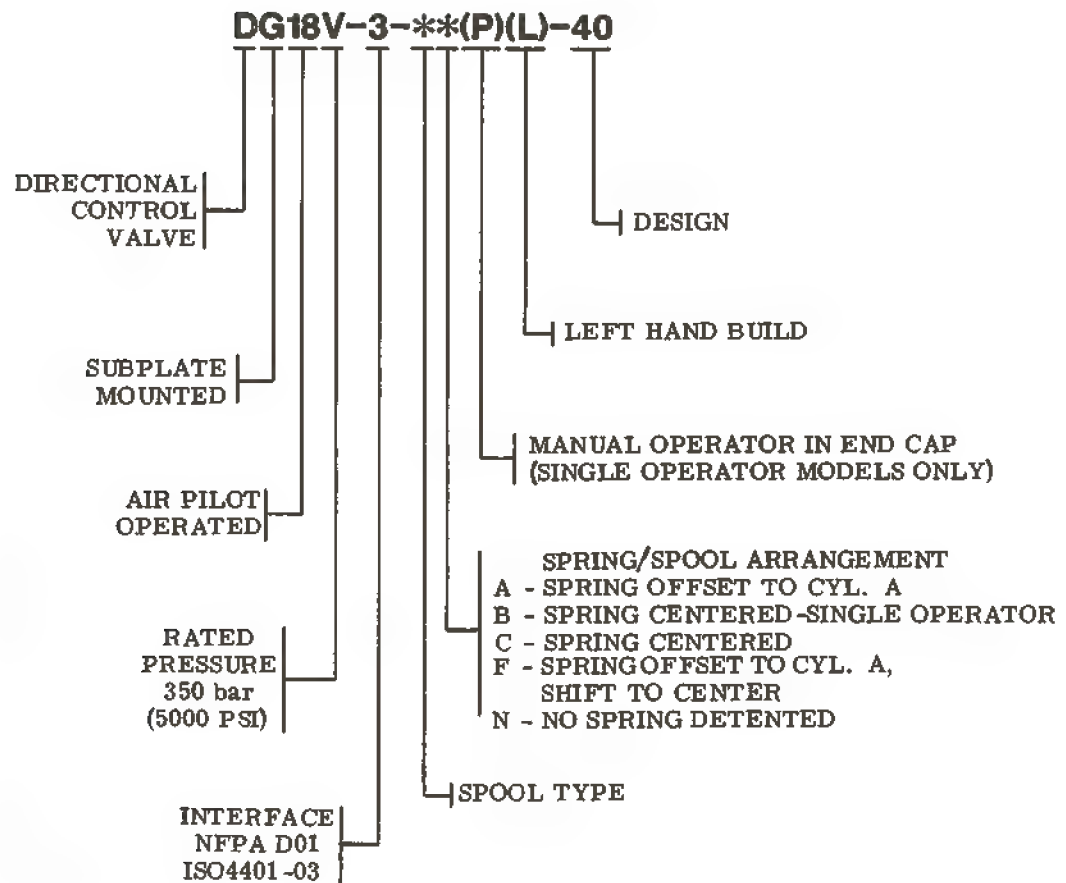
Vickers, Incorporated

P.O. Box 302
Troy, Michigan 48007-0302

Revised 9-1-86

I-3622-S

MODEL CODE BREAKDOWN



Sectional View DG18V-3-*C-40

For satisfactory service life of these components, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from Vickers OFP, OFR, and OFRS series are recommended.

Litho in U. S. A.

634235 END CAP
TORQUE 17-28 N.m
(150-248 lb. in.)

▲262336 "O" RING

635313 SPRING

DG18V-3-*A-40

DG18V-3-*B-40

676268 END CAP
TORQUE 17-28 N.m
(150-248 lb. in.)

*627789 WASHER

635313 SPRING

▲262336 "O" RING

DG18V-3-*C-40

989738 COVER

▲262334 "O" RING

989740 PLUNGER

989744 PLUNGER S/A

633880 SEAL

989739 GUIDE (TORQUE 17-28 N.m 150-248 lb. in.)

▲262336 "O" RING

630406 PIN

▲262327 "O" RING

629601 RETAINER

635313 SPRING

*627789 WASHER

DG18V-3-*F-40

676268 END CAP
TORQUE 17-28 N.m
(150-248 N.m)

631769 SPACER

*627789 WASHER

635313 SPRING

▲262336 "O" RING

627800 WASHER

REFER TO 'C' LAYOUT
FOR PART NUMBERS

DG18V-3-*N-40

DG18V-3-*AP-40

DG18V-*BP/FP-40

676270 END CAP
TORQUE 17-28 N.m
(150-248 lb. in.)

▲262336 "O" RING

676271 PIN

▲262332 "O" RING

635313 SPRING

▲262336
"O" RING

676272 PIN

▲262332 "O" RING

635313 SPRING

*627789 WASHER

MANUAL OPERATOR

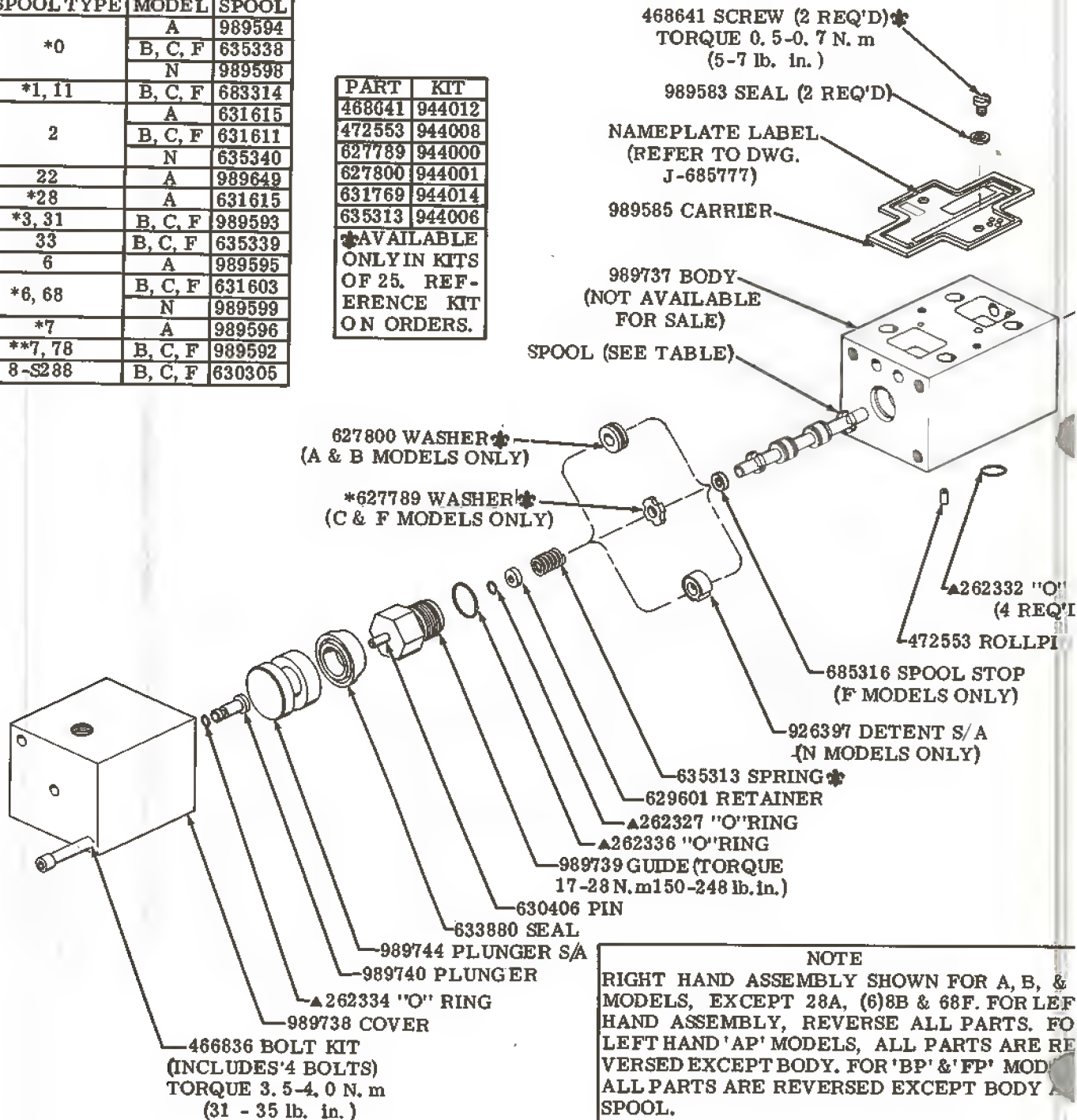
- ▲INCLUDED IN SEAL KIT 920337
- INCLUDED IN MANUAL OPERATOR
AP KIT 926462
- INCLUDED IN MANUAL OPERATOR
BP/FP KIT 926463
- *ASSEMBLE ROUNDED FACE OF
WASHER TOWARDS SPOOL
- ✱AVAILABLE ONLY IN KITS OF 25

SPOOL ASSEMBLY NOTE

- * Assemble '0A' spool with longer end towards operator. Assemble '1' & '3' spool with narrow center land towards 'A' port. Assemble '11' & '31' spool with narrow center land towards 'B' port. Assemble '7A' spool with unslotted end towards operator.
- ** On 'B', 'C' & 'N' models, type '68' spool is same as type '6' spool. Type '68' spool is used as a pilot for 'C' & 'N' two stage valves with '4' or '8' main stage spools only. On spring centered 'C' models, '78' spool is same as '7' spool. Type '78' spool is used as a pilot for 'D' two stage valves with '4' or '8' type spools only.
- ** On 'A' models, type '28' spool is same as type '2' spool. Type '28' spool is used as a pilot for spring offset two stage valves with '4' or '8' type spools only.

SPOOL TYPE	MODEL	SPOOL
*0	A	989594
	B, C, F	635338
	N	989598
*1, 11	B, C, F	683314
2	A	631615
	B, C, F	631611
	N	635340
22	A	989649
*28	A	631615
*3, 31	B, C, F	989593
33	B, C, F	635339
6	A	989595
*6, 68	B, C, F	631603
*7	N	989599
*7, 78	A	989596
8-S288	B, C, F	989592
	B, C, F	630305

PART	KIT
468641	944012
472553	944008
627789	944000
627800	944001
631769	944014
635313	944006
*AVAILABLE ONLY IN KITS OF 25. REFERENCE KIT ON ORDERS.	



VICKERS.
A TRIMOVA COMPANY

Service Parts Information

**Air Pilot
Operated
Directional
Control Valve**

DG18V-3-*A(P)(L)-40
DG18V-3-*B(P)(L)-40
DG18V-3-*C-40
DG18V-3-*F(P)(L)-40
DG18V-3-*N-40



Vickers, Incorporated

1401 Crooks Road
Troy, Michigan 48064

RELEASED 8-1-86

I-3616-S

N3

MODEL CODE BREAKDOWN

DG19S4 - 10 - * * - * - 53 - (LH)

1 2 34 5 6 7

1 AIR CONTROLLED, PILOT OPERATED DIRECTIONAL VALVE,
SLIDING SPOOL, 4-WAY FLOW DIRECTION

2 INTERFACE
NFPA - D10 (ISO-4401-10)

3 MAIN STAGE SPOOL TYPE

4 SPOOL/SPRING ARRANGEMENT

A - SPRING OFFSET
C - SPRING CENTERED
D - PRESSURE CENTERED
N - NO SPRING DETENTED

5 MAIN STAGE OPTIONS
(REFER TO DG5S4 -10 PARTS DRWG.)

6 DESIGN

7 LEFT HAND BUILT PILOT VALVE
FOR SPRING OFFSET TO CYL. 'B' MODELS ONLY
(OMIT FOR STD. SPRING OFFSET TO CYL. 'A' MODELS)

For satisfactory service life of these components, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from Vickers OFP, OFR, and OFRS filter series are recommended.

Litho In U.S.A.

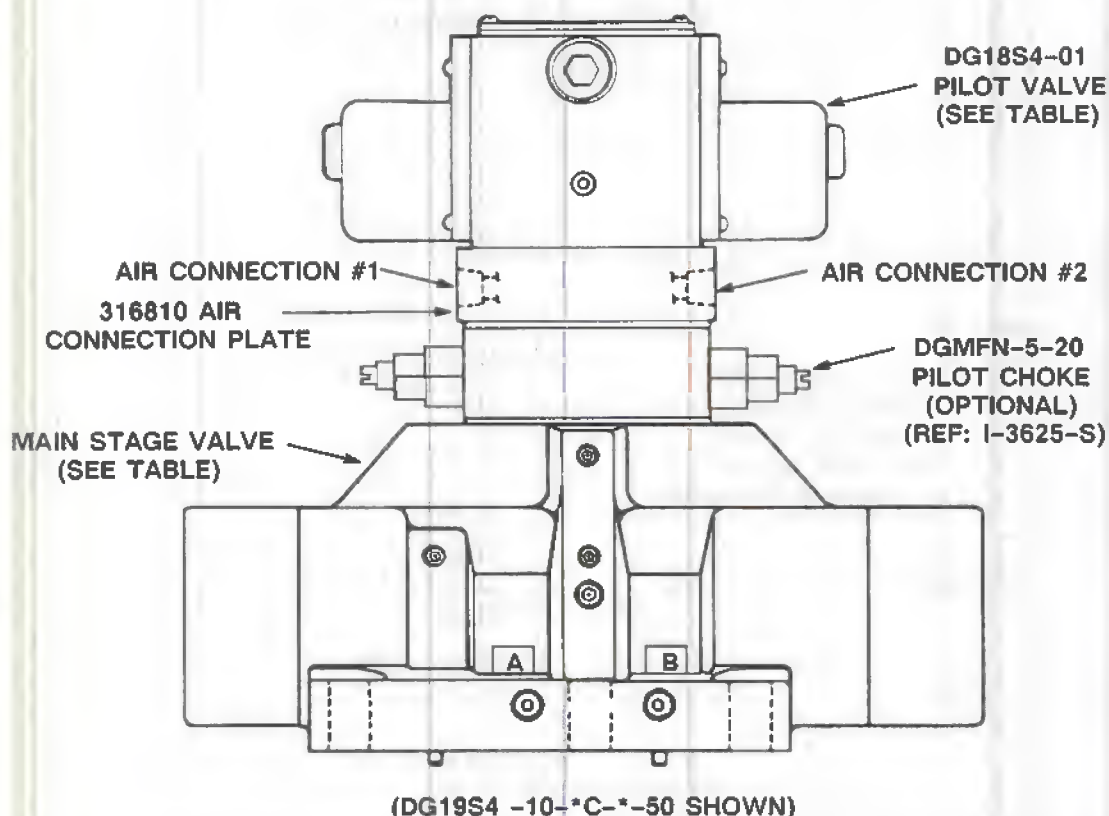
Service Parts Information

AIR CONTROLLED
PILOT OPERATED
DIRECTIONAL VALVE

DG19S4-10-*-*-53

VICKERS

A TRIMONA COMPANY



TO MAKE MODEL	USE MAIN STAGE PORTION OF:	MAIN STAGE PARTS DRWG.	AND PILOT VALVE	PILOT VALVE PARTS DRWG.
DG19S4-10-*A-*-53	DG5S4-10*A-*-53	I-3624-S	DG18S4-0129A-52	I-3592-S
DG19S4-10-*C-*-53	DG5S4-10*C-*-53	I-3624-S	DG18S4-0169C-52	
DG19S4-10-*D-*-53	DG5S4-10*D-*-53	I-3625-S	DG18S4-0179C-52	
DG19S4-10-*N-*-53	DG5S4-10*N-*-53	I-3624-S	DG18S4-0129N-52	I-3554-S

NOTE

In addition to the parts shown in the above drawings, the following parts are required to connect the pilot valve and air connection plate to the main stage:

(4) 10935 Screws

(4) 68907 Lockwasher

(5) 199811 'O'ring

NOTE: If a pilot choke is used, (4) 100026 screws are used instead of (4) 10935 screws.

FOR MODELS LISTED BELOW	USE MAIN STAGE PORTION OF DG5S VALVE	DG5S PARTS DRWG.	AND AIR CONTROLLED DG18V-3-**-40 PILOT VALVE	DG18V-3 PARTS DRWG.
DG19S-H8-*A-50	DG5S-H8-*A-**-50	I-3868-S	DG18V-3-2A-40	I-3616-S
DG19S-H8-4/8A-50	DG5S-H8-4/8A-**-50		DG18V-3-28A-40	
DG19S-H8-*B-50	DG5S-H8-*B-**-50		DG18V-3-6B-40	
DG19S-H8-4/8B-50	DG5S-H8-4/8B-**-50		DG18V-3-68BL-40	
DG19S-H8-*C-50	DG5S-H8-*C-**-50		DG18V-3-6C-40	
DG19S-H8-4/8C-50	DG5S-H8-4/8C-**-50		DG18V-3-68C-40	
DG19S-H8-*F-50	DG5S-H8-*F-**-50		DG18V-3-6F-40	
DG19S-H8-4/8F-50	DG5S-H8-4/8F-**-50		DG18V-3-68F-40	
DG19S-H8-*N-50	DG5S-H8-*C-**-50		DG18V-3-6N-40	
DG19S-H8-4/8N-50	DG5S-H8-4/8C-**-50		DG18V-3-68N-40	
DG19S4-10*A-M-70	DG5S4-10*A-M-70	I-3870-S	DG18V-3-2A-40	I-3616-S
DG19S4-10*A-M-70	DG5S4-104/8A-M-70		DG18V-3-28A-40	
DG19S4-10*B-M-70	DG5S4-10*B-M-70		DG18V-3-6B-40	
DG19S4-104/8B-M-70	DG5S4-104/8B-M-70		DG18V-3-68BL-40	
DG19S4-10*C-M-70	DG5S4-10*C-M-70		DG18V-3-6C-40	
DG19S4-104/8C-M-70	DG5S4-104/8C-M-70		DG18V-3-68C-40	
DG19S4-10*N-M-70	DG5S4-10*C-M-70		DG18V-3-6N-40	
DG19S4-104/8N-M-70	DG5S4-104/8C-M-70	I-3625-S	DG18V-3-68N-40	I-3616-S
DG19S4-10*D-M-70	DG5S4-10*D-**-53		DG18V-3-7F-40	
DG19S4-104/8D-M-70	DG5S4-104/8D-**-53		DG18V-3-78F-40	

MODEL CODE BREAKDOWN

DG19S - (H) * * * * - * * * - * *

1 2 3 4 5 6 7

1 AIR CONTROLLED, PILOT OPERATED DIRECTIONAL VALVE

2 HIGH FLOW
(OMIT ON STD. MODELS)

3 INTERFACE
8 - NFPA-D08 (ISO-4401-08)
10 - NFPA-D10 (ISO-4401-10)

4 MAIN STAGE SPOOL TYPE

5 SPOOL/SPRING ARRANGEMENT

A - SPRING OFFSET
B - SPRING CENTERED, OPERATOR 'A' REMOVED
C - SPRING CENTERED
D - PRESSURE CENTERED (8 & 10 SIZE ONLY)
F - SPRING OFFSET, SHIFT TO CENTER
N - NO SPRING DETENTED

6 MAIN STAGE OPTIONS
(REFER TO DG5S PARTS DRWG.)

7 DESIGN

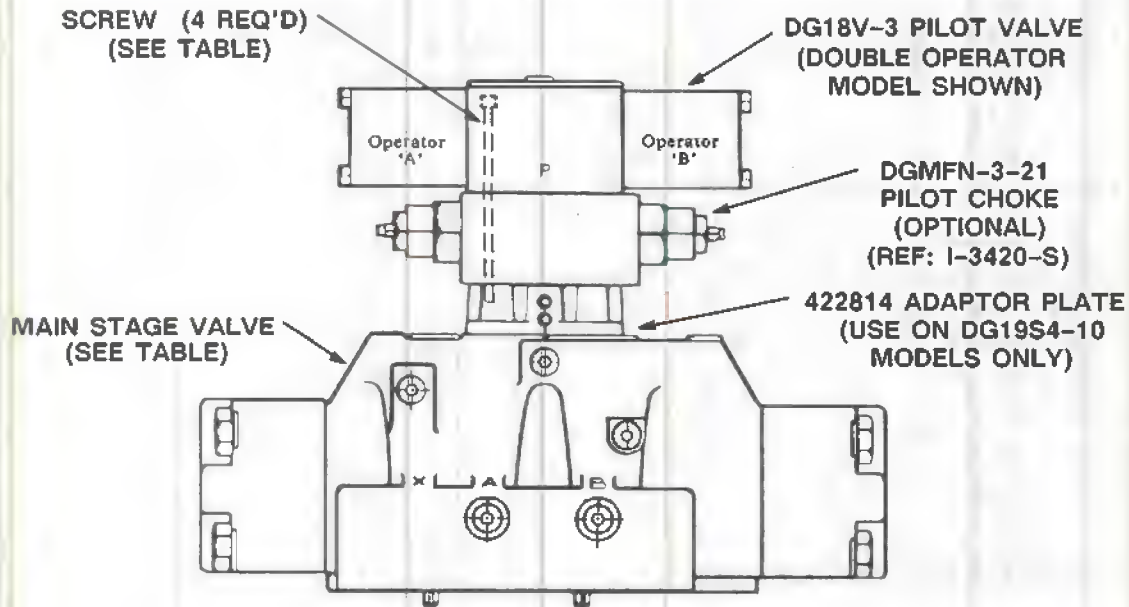
For satisfactory service life of these components, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from Vickers OFP, OFR, and OFRS filter series are recommended.

Service Parts Information

AIR CONTROLLED
PILOT OPERATED
DIRECTIONAL VALVES

DG19S-8-**-20
DG19S-H8-**-50
DG19S4-10-**-M-70

VICKERS
A TRIMBOVA COMPANY



MODEL	SCREW (4 REQ'D) (W/O PILOT CHOKE)	SCREW (4 REQ'D) (WITH PILOT CHOKE)	SCREW TORQUE
DG19S-8-**-20	473732	417413	4.5-5.7 N.m (40-50 lb. in.)
DG19S-H8-**-50			
DG19S4-10**-M-70	10932	207900	

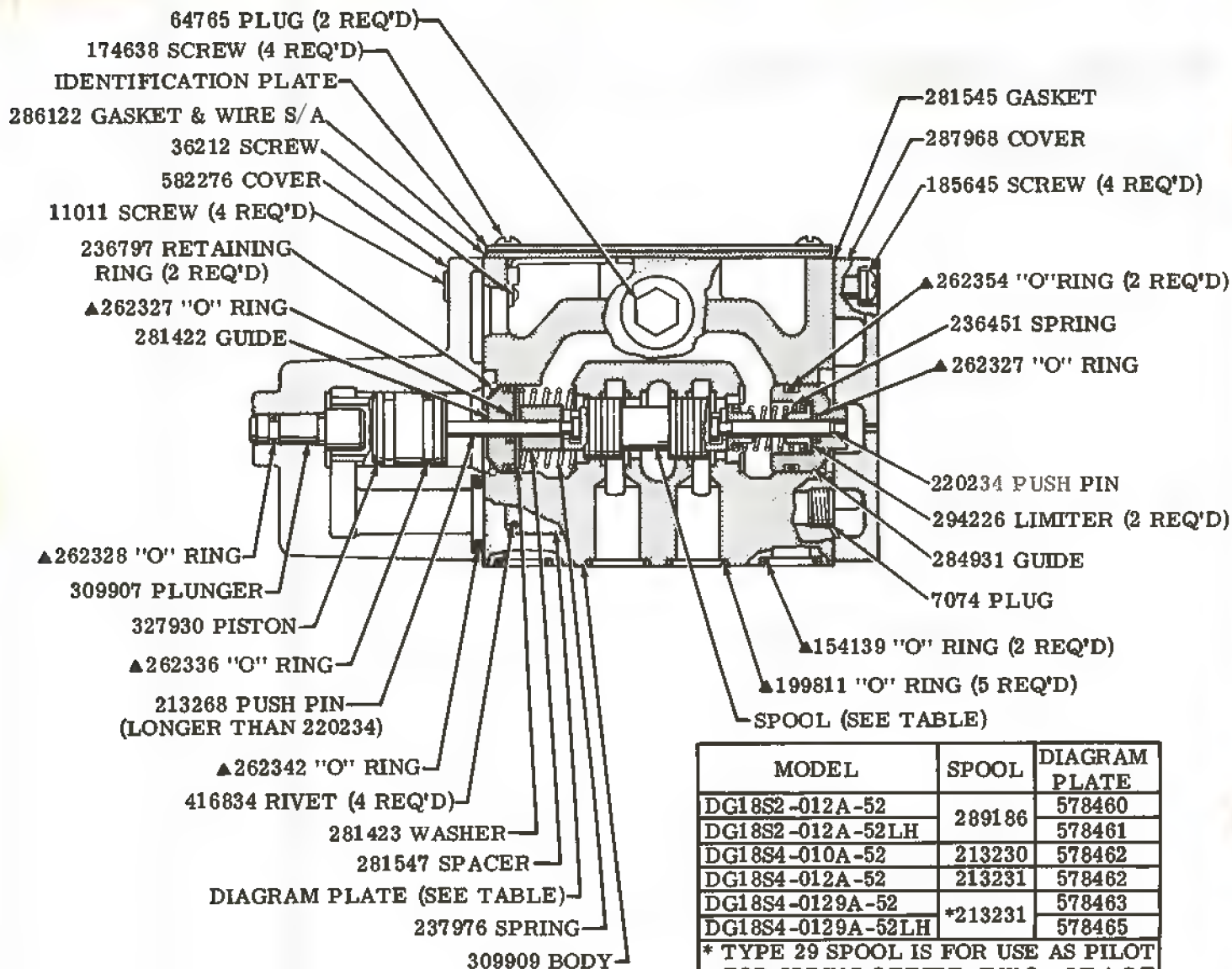
FOR MODELS LISTED BELOW	USE MAIN STAGE PORTION OF DG5S VALVE	DG5S PARTS DRWG.	AND AIR CONTROLLED DG18V-3-**-40 PILOT VALVE	DG18V-3 PARTS DRWG.
DG19S-8-*A-20	DG5S-8-*A-**-20	I-3869-S	DG18V-3-2A-40	I-3616-S
DG19S-8-4/8A-20	DG5S-8-4/8A-**-20		DG18V-3-28A-40	
DG19S-8-*B-20	DG5S-8-*B-**-20		DG18V-3-6B-40	
DG19S-8-4/8B-20	DG5S-8-4/8B-**-20		DG18V-3-68BL-40	
DG19S-8-*C-20	DG5S-8-*C-**-20		DG18V-3-6C-40	
DG19S-8-4/8C-20	DG5S-8-4/8C-**-20		DG18V-3-68C-40	
DG19S-8-*F-20	DG5S-8-*F-**-20		DG18V-3-6F-40	
DG19S-8-4/8F-20	DG5S-8-4/8F-**-20		DG18V-3-68F-40	
DG19S-8-*N-20	DG5S-8-*C-**-20		DG18V-3-6N-40	
DG19S-8-4/8N-20	DG5S-8-4/8C-**-20		DG18V-3-68N-40	
DG19S-8-*D-20	DG5S-8-*D-**-20	I-3873-S	DG18V-3-7F-40	I-3616-S
DG19S-8-4/8D-20	DG5S-8-4/8D-**-20		DG18V-3-78F-40	

Vickers, Incorporated
P.O. Box 302
Troy, Michigan 48007-0302

Released 11-1-87

I-3600-S

111



MODEL	SPOOL	DIAGRAM PLATE
DG18S2-012A-52	289186	578460
DG18S2-012A-52LH		578461
DG18S4-010A-52	213230	578462
DG18S4-012A-52	213231	578462
DG18S4-0129A-52	*213231	578463
DG18S4-0129A-52LH		578465

* TYPE 29 SPOOL IS FOR USE AS PILOT FOR SPRING OFFSET TWO STAGE VALVES ONLY.

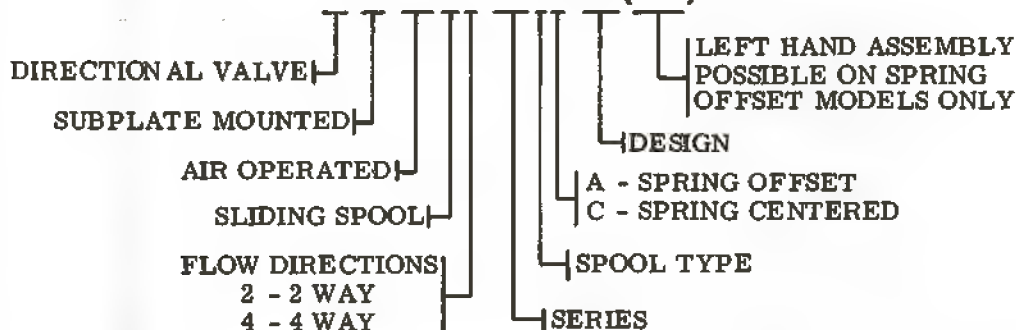
USE DIAGRAM PLATE 578464 FOR DG18S4L. H. MODELS WITH A "0" OR "2" SPOOL.

▲ INCLUDED IN
919681 SEAL KIT

R. H. ASSY SHOWN. THE BODY
IS REVERSED FOR L. H. ASSY.

MODEL CODE BREAKDOWN

D G 18S*-01-52(LH)**



For satisfactory service life of these components in industrial applications, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from Vickers OFF, OFR, and OFRS series are recommended.

Litho in U. S. A.

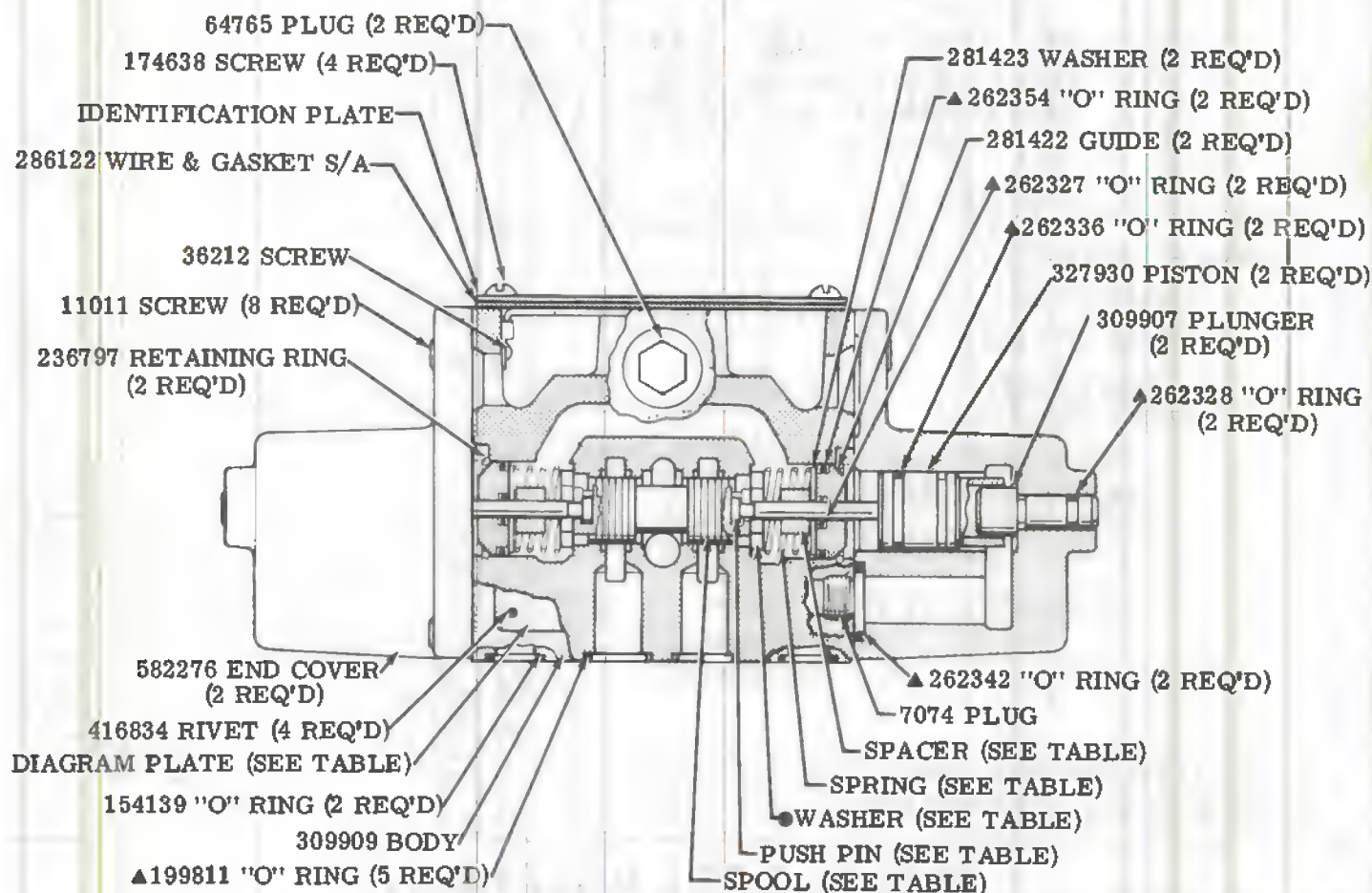
Service Parts Information

AIR OPERATED DIRECTIONAL VALVE

DG18S4-01**C-52
DG18S2-01**A-52
DG18S4-01**A-52

VICKERS

A TRIMONA COMPANY



▲INCLUDED IN
919681 SEAL KIT

●ASSEMBLE ON SPOOL
WITH SHARP EDGE
FACING SPRING.

MODEL	SPOOL	WASHER (2 REQ'D)	SPRING (2 REQ'D)	SPACER (2 REQ'D)	PUSH PIN (2 REQ'D)	DIAGRAM PLATE
DG18S4-010C-52	213230	211846	290072	213273	213268	578447
DG18S4-011C-52	276278					578448
DG18S4-012C-52	213231					578449
DG18S4-013C-52	239903					578450
DG18S4-016C-52	213232					578451
DG18S4-017C-52	236624	283637	217323	297745	290264	578453
DG18S4-018C-52	235637					578455
DG18S4-0133C-52	236615					578456
DG18S4-0169C-52	**213232					578452
DG18S4-0179C-52	***236624					578454

** TYPE '69' SPOOL IS FOR USE AS PILOT FOR SPRING CENTERED TWO STAGE VALVES ONLY.

*** TYPE '79' SPOOL IS FOR USE AS PILOT FOR PRESSURE CENTERED TWO STAGE VALVES ONLY.

Vickers, Incorporated
P.O. Box 302
Troy, Michigan 48007-0302

Revised 5-1-85

I-3592-S

110

MODEL CODE BREAKDOWN

(F3)-DG4S4*-01*F-W3-*-50-(LH)

SEALS FOR
MINERAL OIL & FIRE
RESISTANT FLUIDS

DIRECTIONAL
VALVE

MANIFOLD OR
SUBPLATE
MOUNTING

SOLENOID
OPERATED

SLIDING
SPOOL

FLOW DIRECTION
4 - WAY

SOLENOID INDICATOR LIGHTS
L - LIGHT
(OMITTED - NONE)

LEFT HAND BUILT
(OMIT FOR STD.
R.H. MODELS)

DESIGN

COIL IDENTIFICATION LETTER

WET ARMATURE TYPE SOLENOID
W - NON-SERVICEABLE CORE
TUBE S/A
W3 - SERVICEABLE CORE
TUBE S/A

SPRING OFFSET TO CYL. "A"
SPOOL TRAVEL TO CENTER

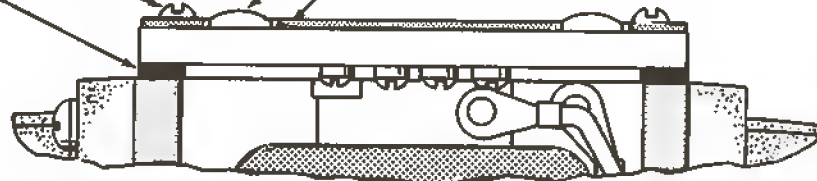
SPOOL TYPE

SERIES

FOR MODELS WITH
SOLENOID INDICATOR LIGHTS

298785 SCREW
298782 GASKET

SOLENOID INDICATOR LIGHT
IDENTIFICATION PLATE



SOLENOID INDICATOR LIGHT KIT (INCLUDES ALL PARTS IDENTIFIED)	
VOLTAGE RANGE	KIT
100 thru 127	941615
192 thru 233	941617

NOTE
REFER TO PARTS DRAWING I-3487-S
FOR MODELS WITH PLUG-IN FEATURE.

For satisfactory service life of these components in industrial applications, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from Vickers OFP, OFR, and OFRS series are recommended.

Litho in U.S.A.

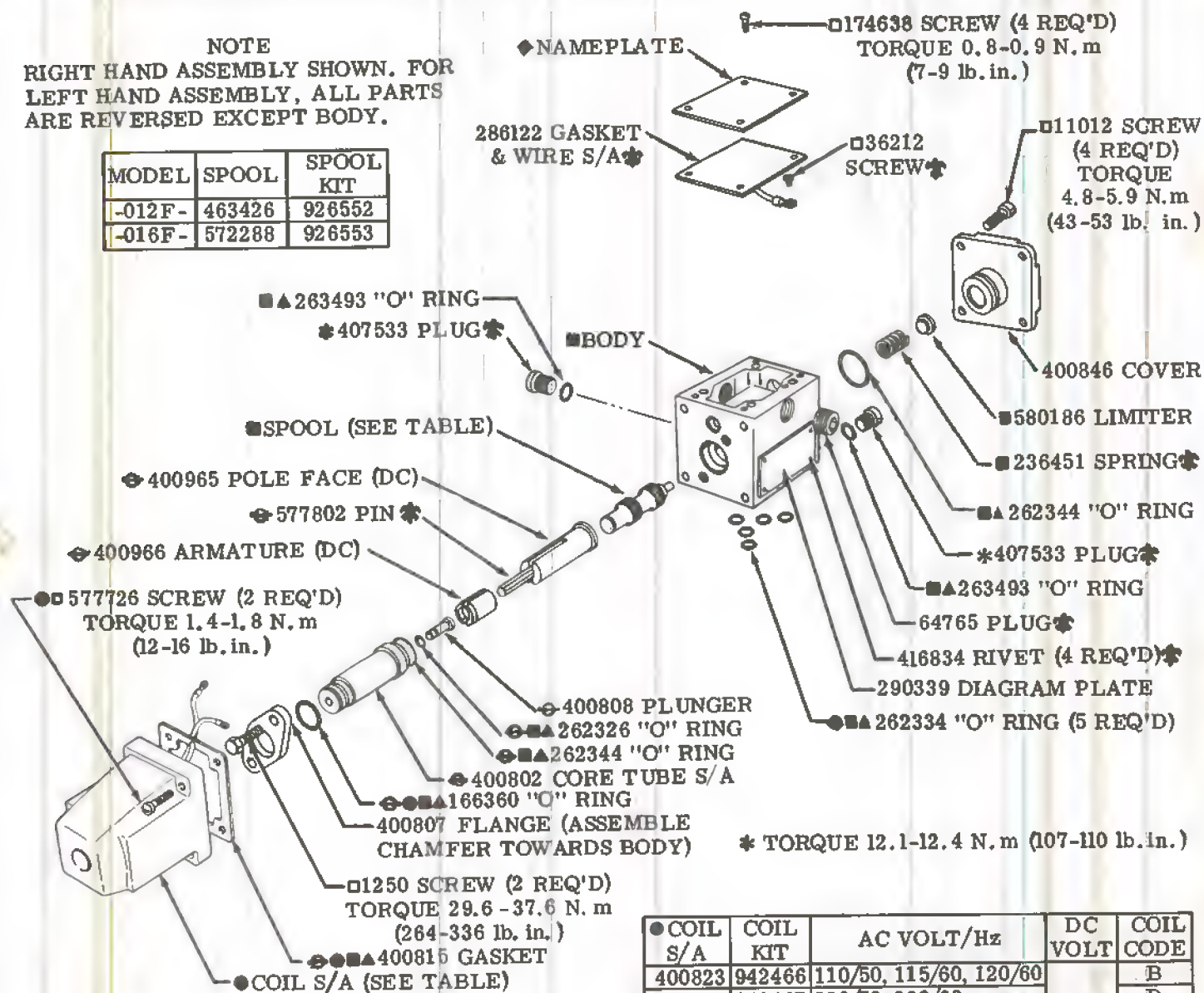
WET ARMATURE SPRING OFFSET DIRECTIONAL VALVE

Service Parts Information

(F3)DG4S4-01 * F-W3-* -50(LH)

NOTE
RIGHT HAND ASSEMBLY SHOWN. FOR
LEFT HAND ASSEMBLY, ALL PARTS
ARE REVERSED EXCEPT BODY.

MODEL	SPOOL	SPOOL KIT
-012F-	463426	926552
-016F-	572288	926553

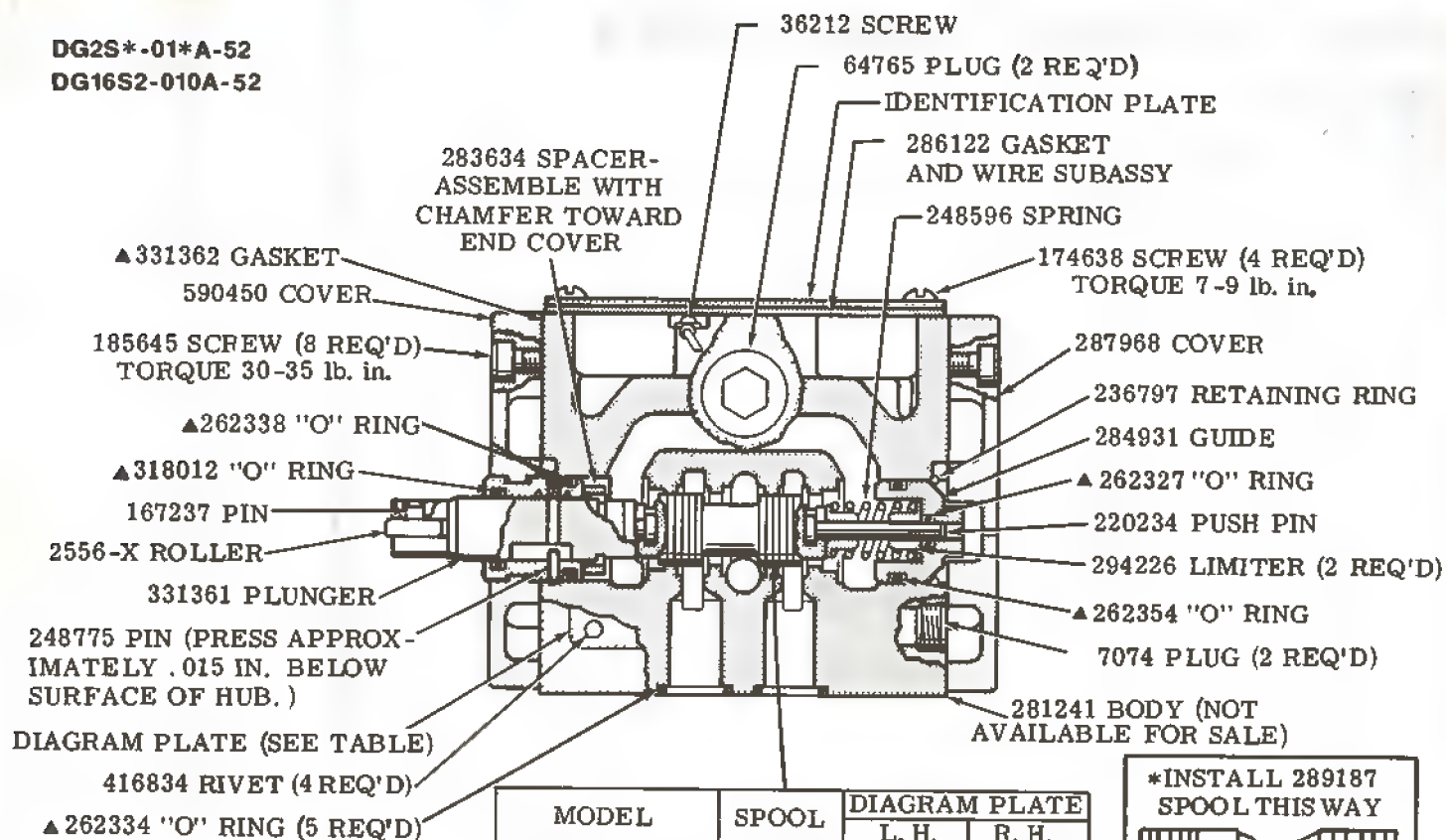


- INCLUDED IN SPOOL KIT
- INCLUDED IN FASTENER KIT 942465
- ▲ INCLUDED IN F3 SEAL KIT 920109
- ◆ INCLUDED IN SERVICEABLE 'DC' CORE TUBE S/A KIT 926551
- NON-SERVICEABLE 'AC' CORE TUBE S/A 587259
- INCLUDED IN COIL KIT
- ◆ AVAILABLE ONLY IN KITS OF 25 EACH
- ◆ NOT AVAILABLE FOR SALE

● COIL S/A	COIL KIT	AC VOLT/Hz	DC VOLT	COIL CODE
400823	942466	110/50, 115/60, 120/60	—	B
400824	942467	220/50, 230/60		D
400825	942468	440/50, 460/60		M
400826	942469	—	12	G
400827	942470	—	24	H
435755	941017	127/50	—	EG
582214	941109	—	250	X
730273	926461	—	48	J

CAUTION
CORRECT CORE TUBE S/A MUST BE USED
FOR AC AND DC OPERATION

DG2S*-01*A-52
DG16S2-010A-52



MODEL	SPOOL	DIAGRAM PLATE	
		L. H.	R. H.
DG2S2-012A-52	289186	578491	578490
DG2S4-010A-52	213230		
DG2S4-012A-52	213231		
DG2S4-016A-52	213232	578493	578492
DG2S4-017A-52	236624		
DG2S4-0133A-52	236615		
DG16S2-010A-52	289187	578494	

*INSTALL 289187 SPOOL THIS WAY

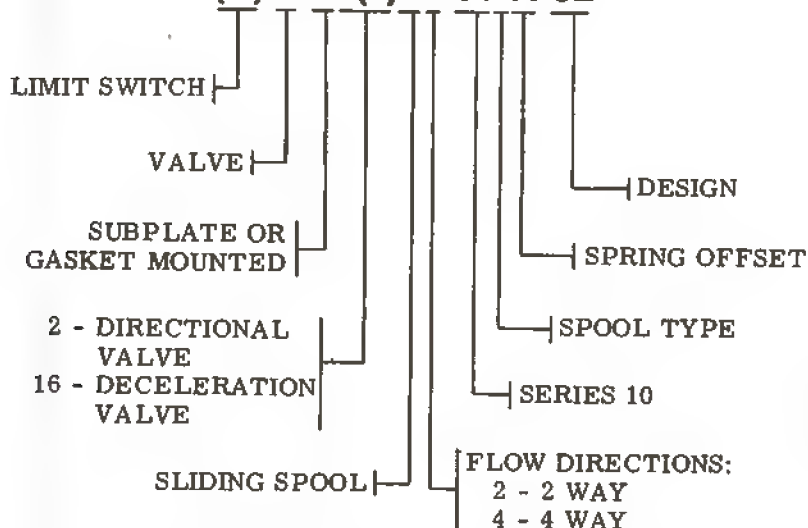


TOWARDS OPERATING STEM

▲SERVICE ALL UNITS
W/F3 SEAL KIT 919432

MODEL CODE BREAKDOWN

(S) D G*(*)S*-01*A-52



For satisfactory service life of these components, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from Vickers OFP, OFR, and OFRS series are recommended.

Litho in U. S. A.

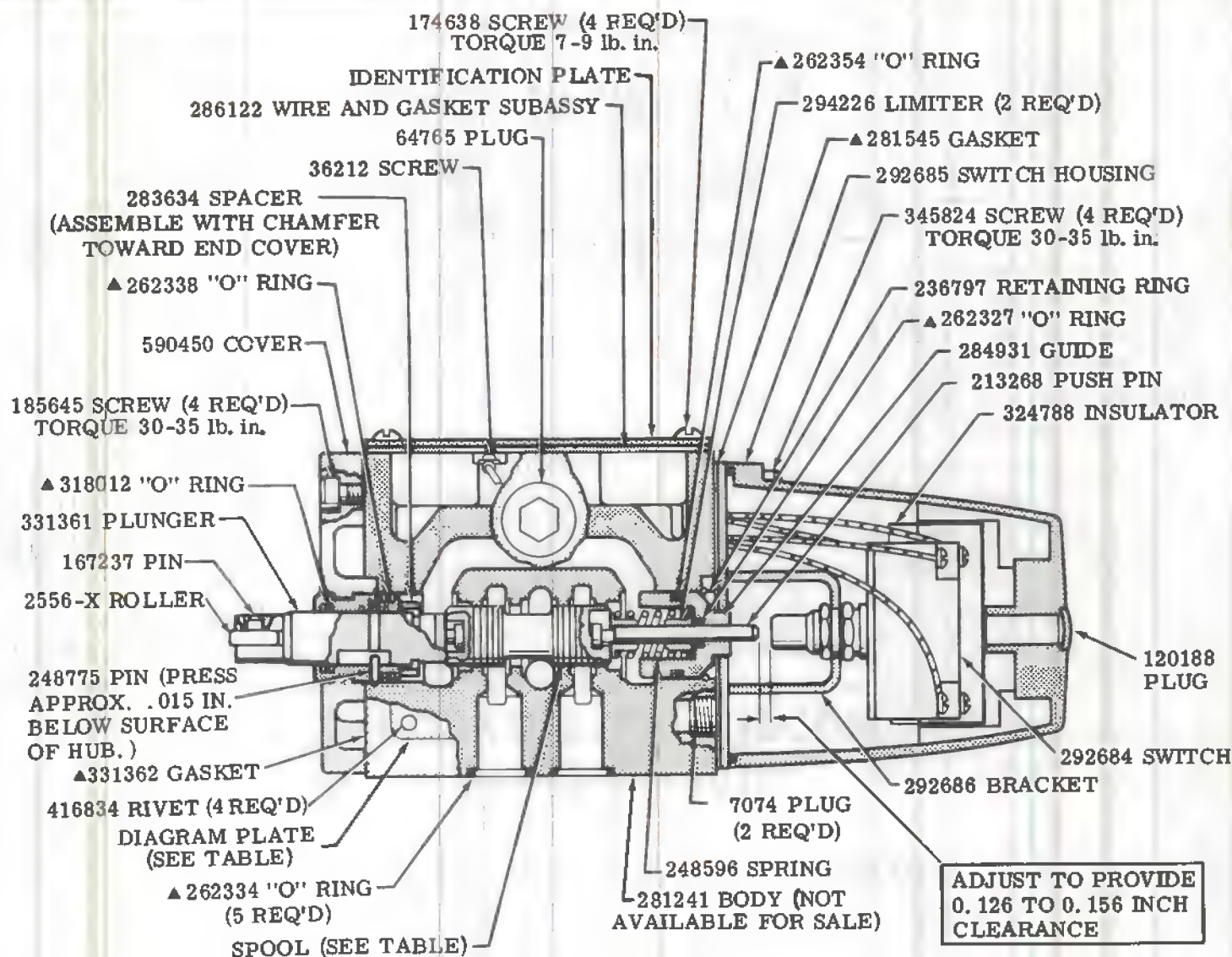
Service Parts Information

**MECHANICALLY
OPERATED
DIRECTIONAL AND
DECELERATION VALVES**

VICKERS

A TRIMONA COMPANY

SDG2S*-012A-52 DG2S*-01*A-52 DG16S2-010A-52



▲SERVICE ALL UNITS
W/ F3 SEAL KIT 919432

MODEL	SPOOL	DIAGRAM PLATE	
		L. H.	R. H.
SDG2S2-012A-52(LH)	238966	578491	578490
SDG2S4-010A-52(LH)	213230		
SDG2S4-012A-52(LH)	213231	578493	578492
SDG2S4-016A-52(LH)	213232		
SDG2S4-017A-52(LH)	236624		

RIGHT HAND ASSEMBLY SHOWN.
IN LEFT HAND ASSEMBLY ALL
PARTS OF VALVE EXCEPT BODY
ARE REVERSED.
EXAMPLE OF L. H. MODEL:
SDG2S2-012A-52-L. H.

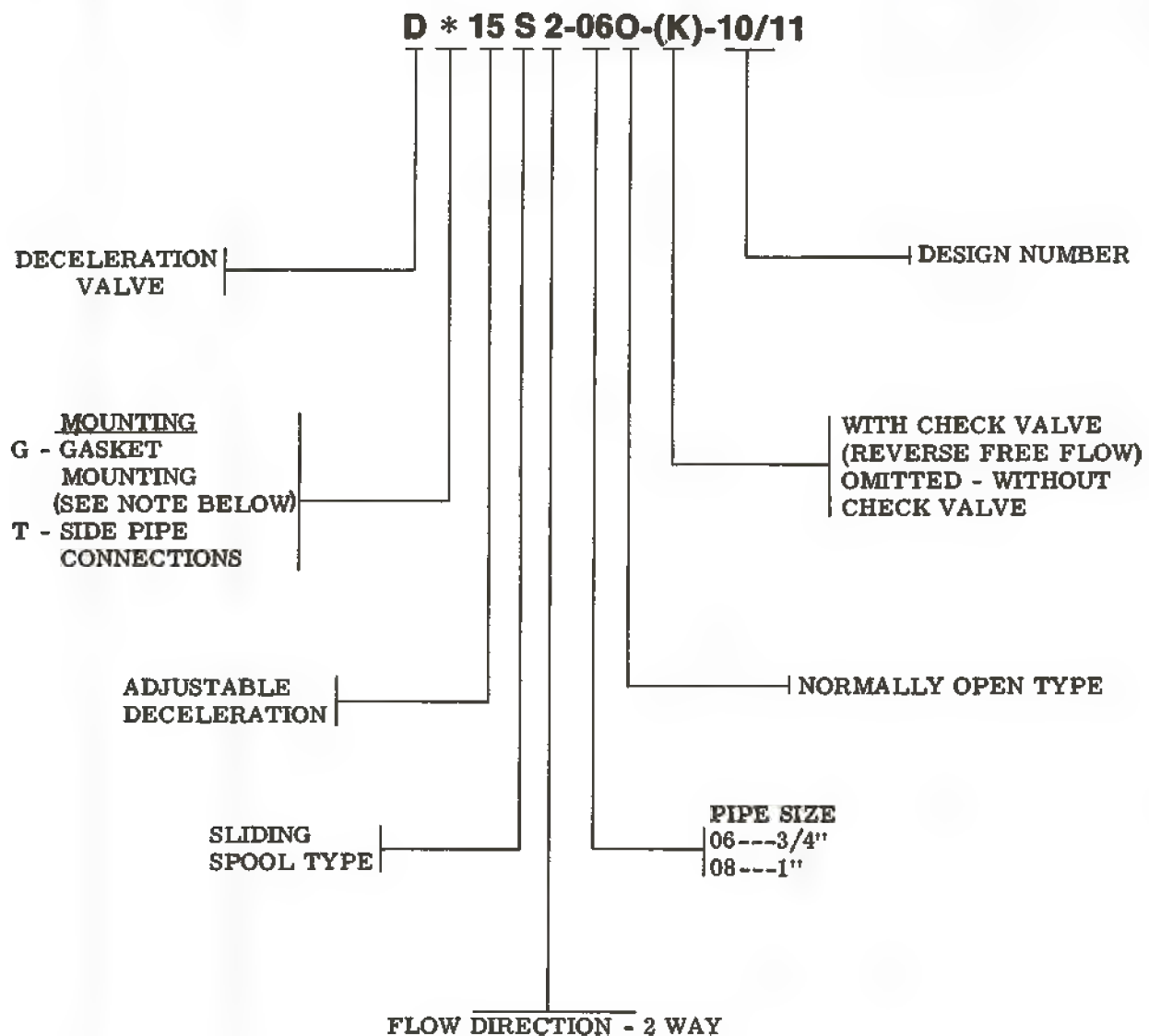
Vickers, Incorporated
P.O. Box 302
Troy, Michigan 48007-0302

Revised 11-1-85

I-3572-S

106

MODEL CODE BREAKDOWN



NOTE: MOUNTING SUB-PLATES FOR THE GASKET MOUNTED SERIES:

SUB-PLATE	PORT SIZE	BOLT KIT
DG15SM-06-10	3/4" NPT	BKDG15-06-627
DG15M-08-10	1" NPT	CONSISTS OF 4 1078-A SCREWS

For satisfactory service life of these components in industrial applications, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from Vickers OFF, OFR, and OFRS series are recommended.

Litho In U. S. A.

Service Parts Information

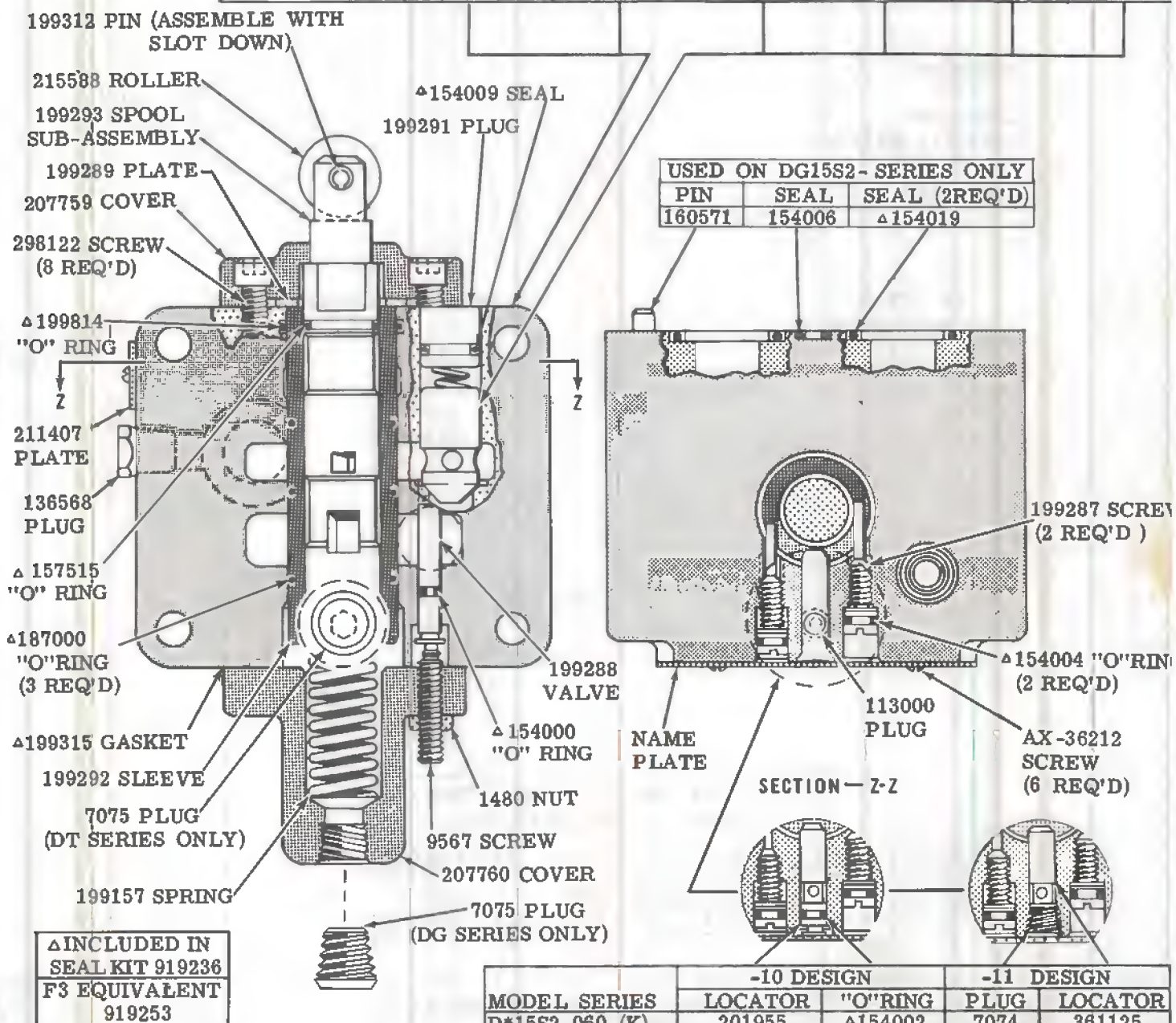
VICKERS

A TRIMONA COMPANY

**DECELERATION VALVES
NORMALLY OPEN TYPE
3/4" NOMINAL PIPE SIZE**

**DG15S2 Series Gasket Mounted
DT15S2 Series Side Pipe Thd. Conn.**

MODEL SERIES	BODY -10 DESIGN	BODY -11 DESIGN	POPPET	SPRING	PLUG	SEAL
DG15S2-060-K	207761	361130	118-X	20636	—	—
DT15S2-060-K	207764	361131				
DG15S2-060	207761	361130	—	—	211768	Δ154006
DT15S2-060	207764	361131				



Vickers, Incorporated
P.O. Box 302
Troy, Michigan 48007-0302

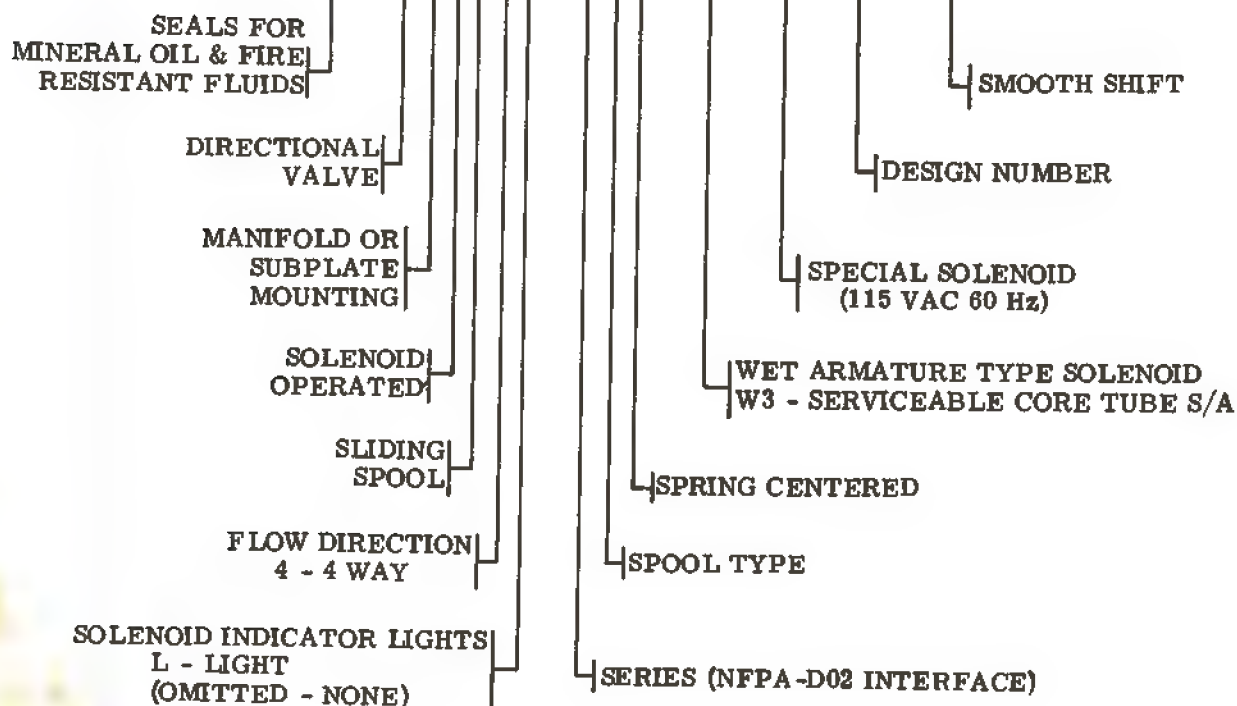
Revised 8-1-86

I-3571-S

107

MODEL CODE BREAKDOWN

(F3)-DG4S4*-01*C-W3-BB-50-S410

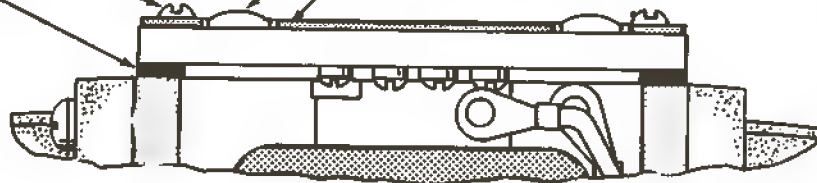


FOR MODELS WITH
SOLENOID INDICATOR LIGHTS

298785 SCREW
298782 GASKET

SOLENOID INDICATOR LIGHT
IDENTIFICATION PLATE

SOLENOID INDICATOR LIGHT KIT (INCLUDES ALL PARTS IDENTIFIED)	
VOLTAGE RANGE	KIT
100 thru 127	941615



NOTE

REFER TO PARTS DRAWING I-3487-S
FOR MODELS WITH PLUG-IN FEATURE.

For satisfactory service life of these components in industrial applications, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from Vickers OFP, OFR, and OFRS series are recommended.

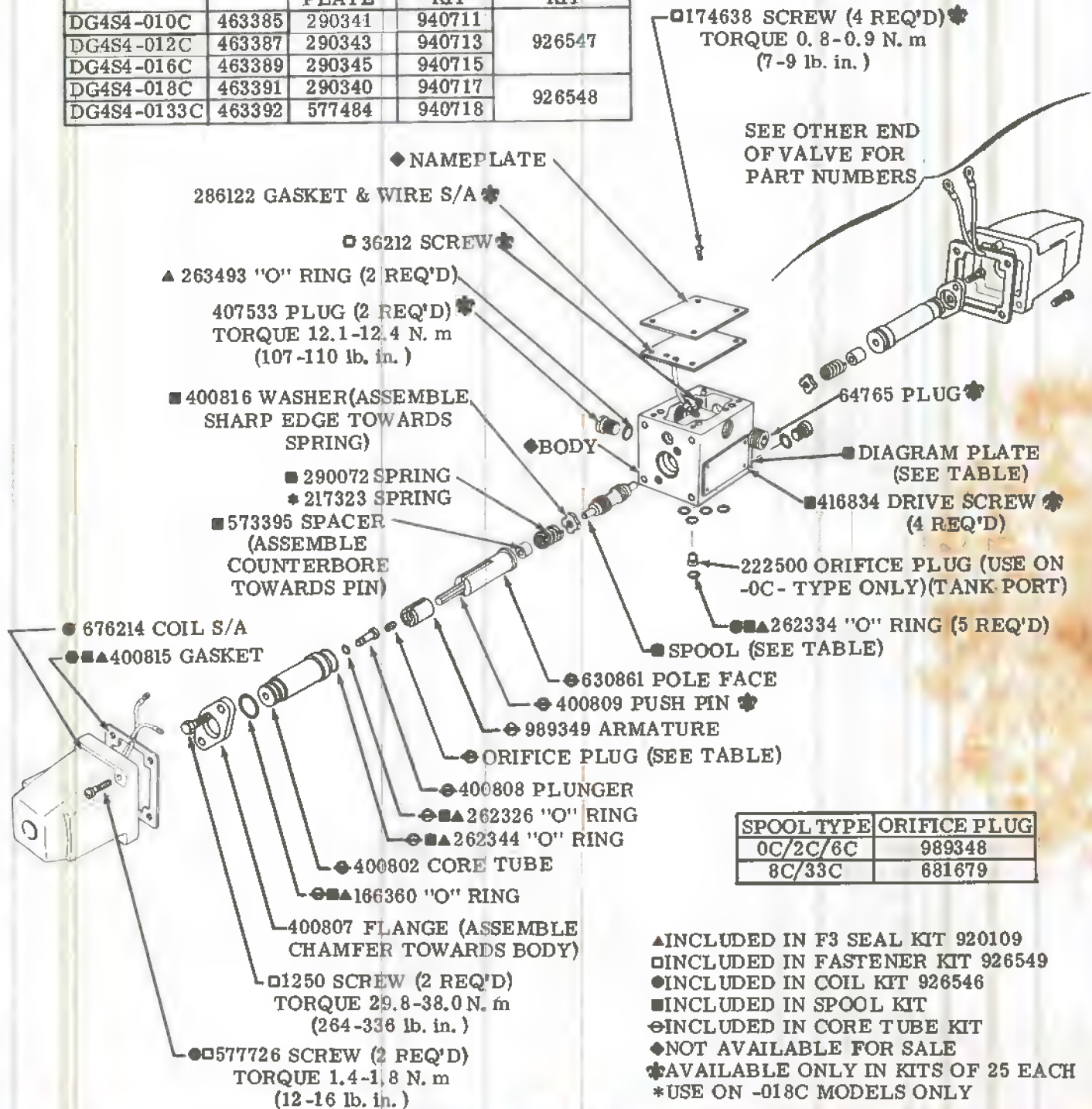
Litho in U.S.A.

**SMOOTH SHIFT
WET ARMATURE
DIRECTIONAL VALVE**

Service Parts Information

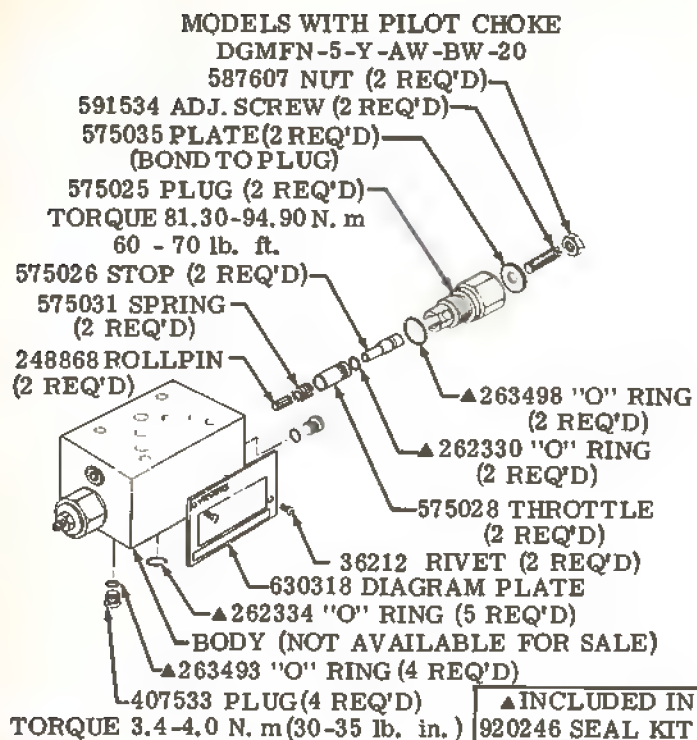
(F3)DG4S4-01*C-W3-BB-50-S410

MODEL	SPOOL	DIAGRAM PLATE	■ SPOOL KIT	⊖ CORE TUBE KIT
DG4S4-010C	463385	290341	940711	926547
DG4S4-012C	463387	290343	940713	
DG4S4-016C	463389	290345	940715	
DG4S4-018C	463391	290340	940717	
DG4S4-0133C	463392	577484	940718	926548

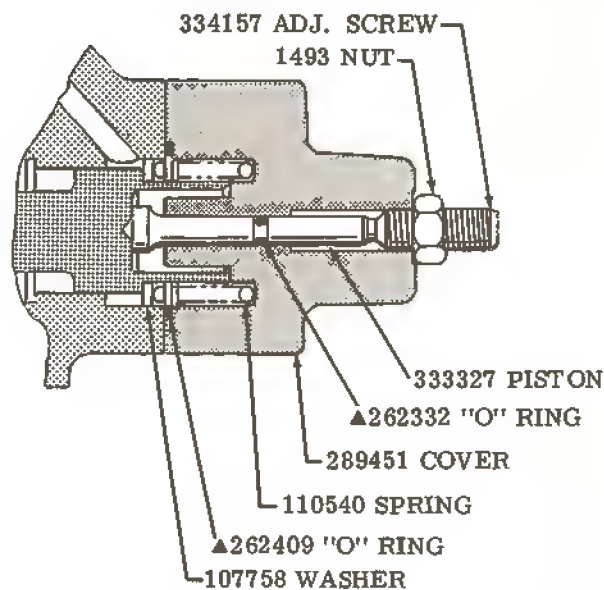


SPOOL TYPE	ORIFICE PLUG
0C/2C/6C	989348
8C/33C	681679

- ▲ INCLUDED IN F3 SEAL KIT 920109
- INCLUDED IN FASTENER KIT 926549
- INCLUDED IN COIL KIT 926546
- INCLUDED IN SPOOL KIT
- ⊖ INCLUDED IN CORE TUBE KIT
- ◆ NOT AVAILABLE FOR SALE
- * AVAILABLE ONLY IN KITS OF 25 EACH
- * USE ON -018C MODELS ONLY



**STROKE ADJUSTMENT PARTS
 ("B" END ONLY)**



MODEL CODE BREAKDOWN

(F3) - D G 3 S 4 - 10 * D (X) - * - 53

SEALS FOR MINERAL OIL
 OR FIRE RESISTANT FLUID

DIRECTIONAL VALVE

SUBPLATE OR
 MANIFOLD MOUNTED

PILOT OPERATED

SLIDING SPOOL

FLOW DIRECTIONS
 4 - 4 WAY

DESIGN

SPOOL CONTROL MODIFICATION
 (OMIT IF NOT REQUIRED)
 2 - PILOT CHOKE ADJS.
 8 - STROKE ADJUSTMENT
 CYLINDER "B" END ONLY
 2-8 - IF BOTH ARE REQUIRED

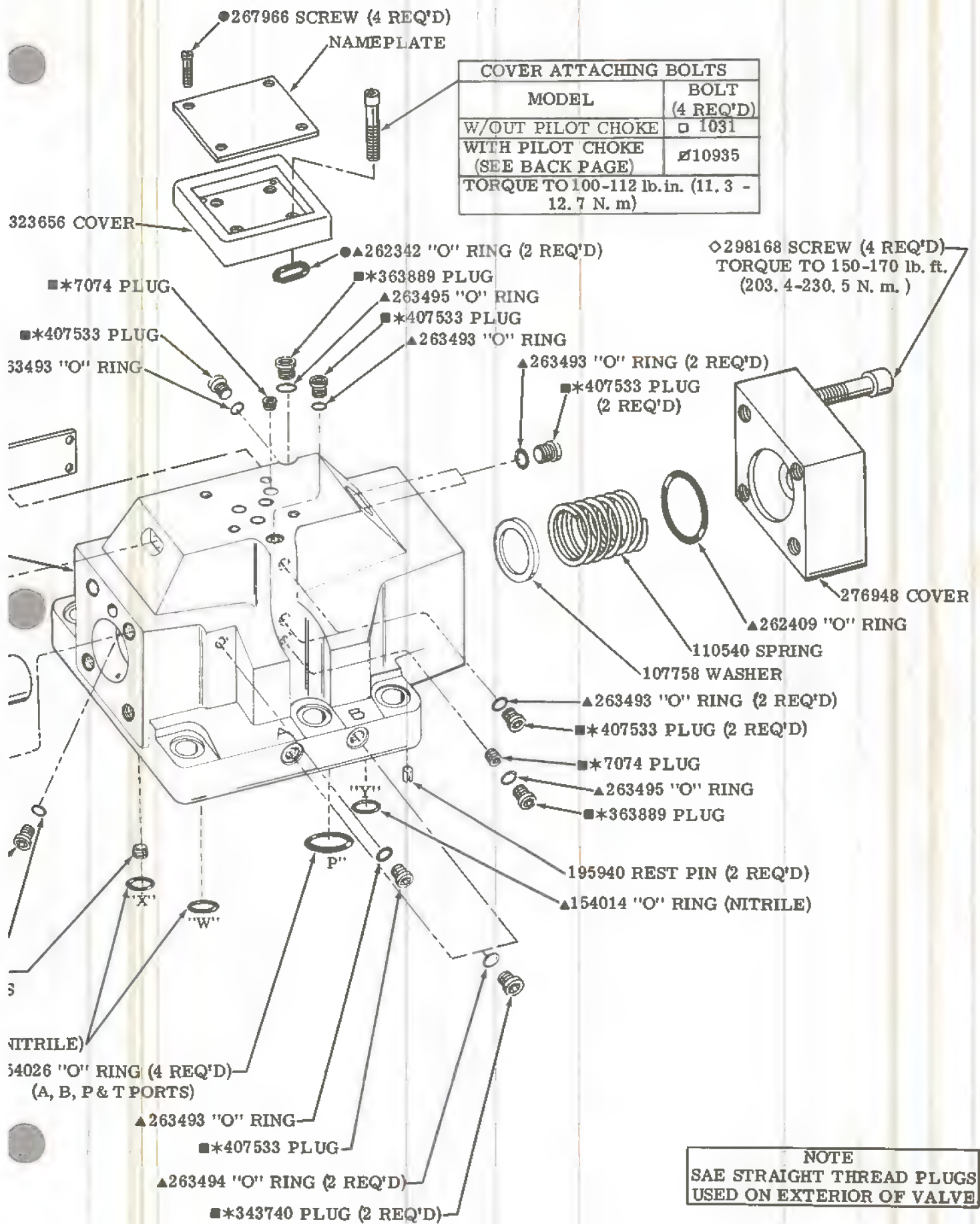
X - FAST RESPONSE MODEL
 OMITTED - STD LOW SHOCK MODELS

PRESSURE CENTERED

SPOOL TYPE

SERIES 100
 (1.250 INCH)

For satisfactory service life of these components, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from Vickers OFP, OFR, and OFRS series are recommended.





A TRIMONA COMPANY

Service Parts Information

**Pressure
Centered
Pilot Operated
Directional
Control Valves**

DG3S4-10*D*-*-53



Vickers, Incorporated

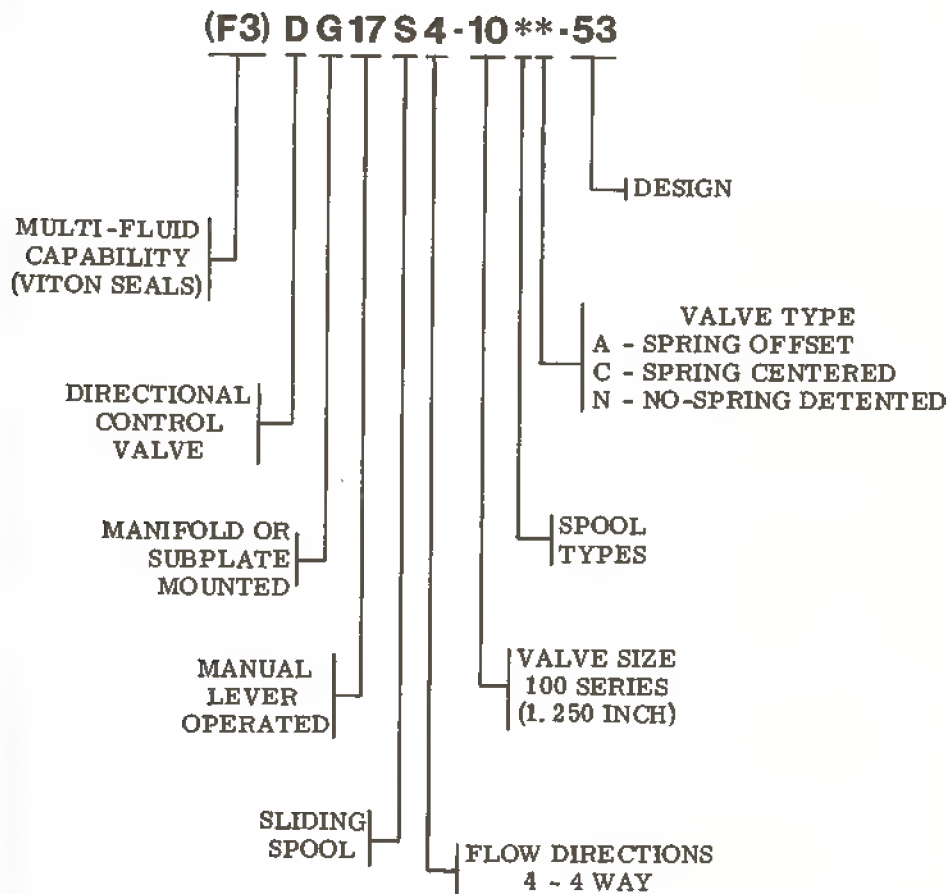
1401 Crooks Road
Troy, Michigan 48064

Revised 11-1-85

I-3569-S

105

MODEL CODE BREAKDOWN



For satisfactory service life of these components in industrial applications, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from Vickers OFP, OFR, and OFRS series are recommended.

Litho in U. S. A.

USED ON SPRING
CENTERED (C)
MODELS ONLY

298168 SCREW (4 REQ'D)
TORQUE TO 203-230 N. m
(150-170 lb. ft.)

276948 COVER

▲262409 "O" RING

281803 SPRING

107758 WASHER

PARTS USED ON NO-SPRING
DETENTED (N) & SPRING
CENTERED (C)
MODELS ONLY

*■407533 PLUG

▲263493 "O" RING

*■407533 PLUG

▲263493 "O" RING

◇298168 SCREW (4 REQ'D)
TORQUE TO 203-230 N. m
(150-170 lb. ft.)

408491 WARNING TAG

416834 RIVET
(2 REQ'D)

278467 COVER

▲262409 "O" RING

110541 SPRING

PARTS FOR SPRING OFFSET
(A) MODELS ONLY

◆435501 BODY

6 "O" RING (4 REQ'D)
A, B, P & T PORTS)

95940 REST PIN (2 REQ'D)

▲263494 "O" RING

*■343740 PLUG

▲263494 "O" RING

*■343740 PLUG

SEAL KIT NOTE

The -53 design valves are manufactured as shown with F3 seals used internally. Interface seals are standard Nitrile material and are converted to F3 in the seal kit. All seals in the seal kit are F3.

MODEL	SPOOL	ID PLATE W/ CIRCUIT DIAGRAM			
		OFFSET A		SPRING CNTR (C)	NO-SPRING DETENT (N)
		LH	RH		
DG17S4-100A/C/N	282281	434310	431539	431900	431903
DG17S4-102A/C/N	282287	—	—	431540	431541
DG17S4-104C/N	282286	—	—	431549	431905
DG17S4-106A/C/N	282283	434310	431539	431902	431906
DG17S4-108C/N	282339	—	—	431549	431905
DG17S4-1033A/C/N	282285	434310	431539	431902	431906

NOTE

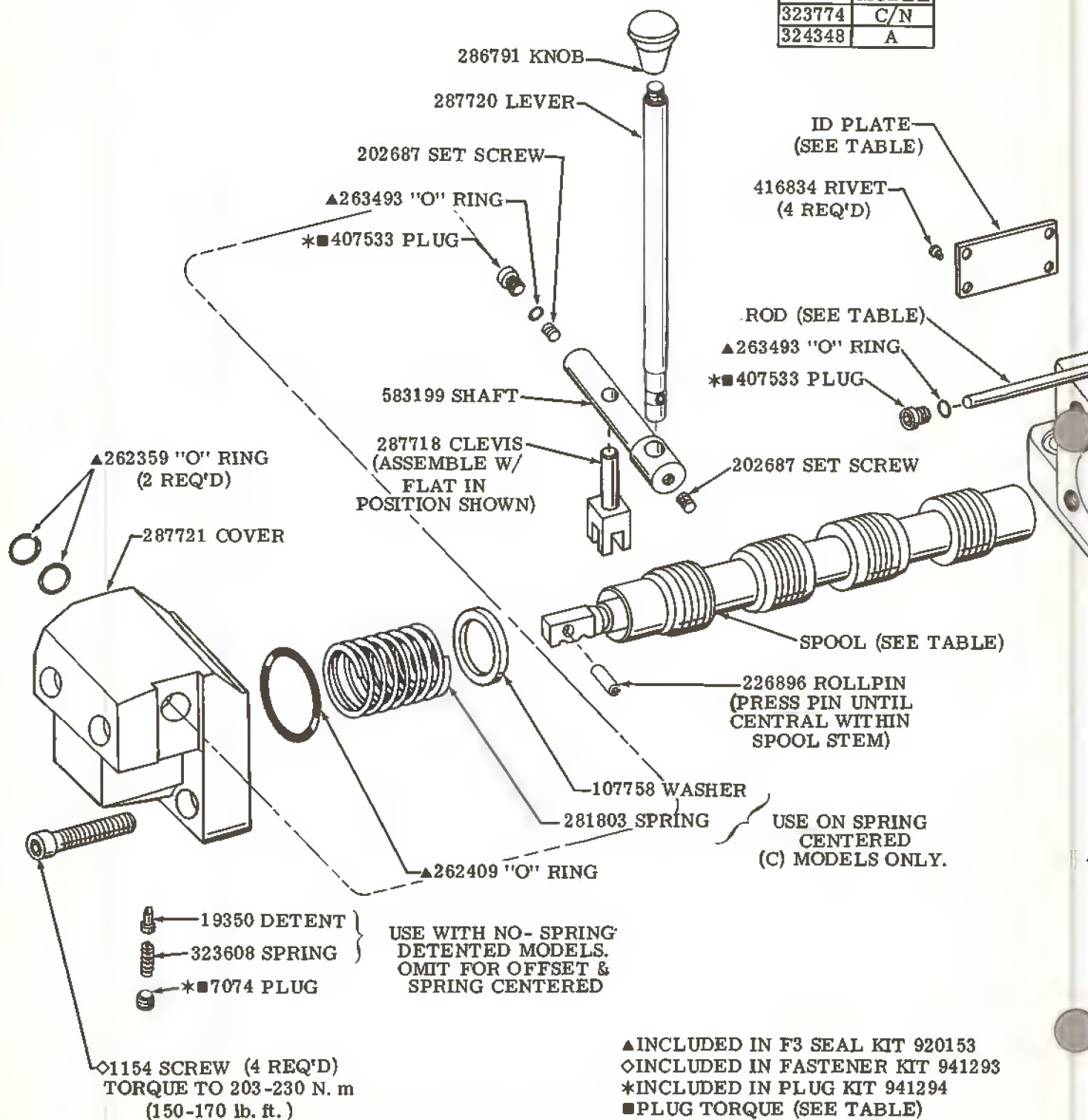
RIGHT HAND POSITION SHOWN. REVERSE END COVERS, SPOOL, & SPRING FOR LEFT HAND ASSEMBLY. CHANGE ID PLATE TO LEFT HAND (L. H.) ON SPRING OFFSET MODELS.

NOTE
PARTS INCLUDED IN SERVICE
KITS NOT SOLD SEPARATELY

■ PLUG TORQUE

PLUG	N. m.	lb. in.
7074	8.47 - 9.6	75 - 85
343740	10.0 - 11.8	90 - 105
407533	3.4 - 4.0	30 - 35

ROD	MODEL
323774	C/N
324348	A



Service Parts Information

**Manual Lever
Operated
Directional
Valve**

DG17S4-10*A-53
DG17S4-10*C-53
DG17S4-10*N-53



Vickers, Incorporated

1401 Crooks Road
Troy, Michigan 48064

Revised 9-1-85

I-3564-S

104

TECHNICAL INFORMATION

INTRODUCTION

General

The trouble-shooting charts and maintenance hints that follow are of a general system nature but should provide an intuitive feeling for a specific system. The more general information is covered in the immediately following paragraphs. Effect and probable cause charts appear on the following pages.

System Design

There is, of course, little point in discussing the design of a system which has been operating satisfactorily for a period of time. However, a seemingly uncomplicated procedure such as relocating a system or changing a component part can cause problems. Because of this, the following points should be considered:

- A. Each component in the system must be compatible with and form an integral part of the system. For example, an inadequate size filter on the inlet of a pump can cause cavitation and subsequent damage to the pump.
- B. All lines must be of proper size and free of restrictive bends. An undersized or restricted line results in a pressure drop in the line itself.

- C. Some components must be mounted in a specific position with respect to other components or the lines. The housing of an in-line pump, for example, must remain filled with fluid to provide lubrication.
- D. The inclusion of adequate test points for pressure readings, although not essential for operation, will expedite trouble-shooting.

Knowing the System

Probably the greatest aid to trouble-shooting is the confidence of knowing the system. The construction and operating characteristics of each one should be understood. For example, knowing that a solenoid controlled directional valve can be manually actuated will save considerable time in isolating a defective solenoid. Some additional practices which will increase your ability and also the useful life of the system follow:

- A. Know the capabilities of the system. Each component in the system has a maximum rated speed, torque, or pressure. Loading the system beyond the specifications simply increases the possibility of failure.

- B. Know the correct operating pressures. Always set and check pressures with a gauge. How else can you know if the operating pressure is above the maximum rating of the components? The question may arise as to what the correct operating pressure is. If it isn't correctly specified on the hydraulic schematic, the following rule should be applied:

The correct operating pressure is the lowest pressure which will allow adequate performance of the system function and still remain below the maximum rating of the components and machine.

Once the correct pressures have been established, note them on the hydraulic schematic for future reference.

- C. Know the proper signal levels, feedback levels, and dither and gain settings in servo control systems. If they aren't specified, check them when the system is functioning correctly and mark them on the schematic for future reference.

Developing Systematic Procedures

Analyze the system and develop a logical sequence for setting valves, mechanical stops, interlocks, and electrical controls. Tracing of flow paths can often be accomplished by listening for flow in the lines or feeling them for warmth. Develop a cause and effect troubleshooting guide similar to the charts appearing on

the following pages. The initial time spent on such a project could save hours of system down-time.

Recognizing Trouble

The ability to recognize trouble indications in a specific system is usually acquired with experience. However, a few general trouble indications can be discussed.

- A. Excessive heat means trouble.
 - A mis-aligned coupling places an excessive load on bearings and can be readily identified by the heat generated. A warmer than normal tank return line on a relief valve indicates operation at relief valve setting. Hydraulic fluids which have a low viscosity will increase the internal leakage of components resulting in a heat rise. Cavitation and slippage in a pump will also generate heat.

- B. Excessive noise means wear, mis-alignment, cavitation or air in the fluid. Contaminated fluid can cause a relief valve to stick and chatter. These noises may be the result of dirty filters, or fluid, high fluid viscosity, excessive drive speed, low reservoir level, loose intake lines, or worn couplings.

Maintenance

Three simple maintenance procedures have the greatest effect on hydraulic system performance, efficiency, and life. Yet, the very simplicity of them may be the reason they are so often overlooked. What are they?

TROUBLE-SHOOTING GUIDE AND MAINTENANCE HINTS

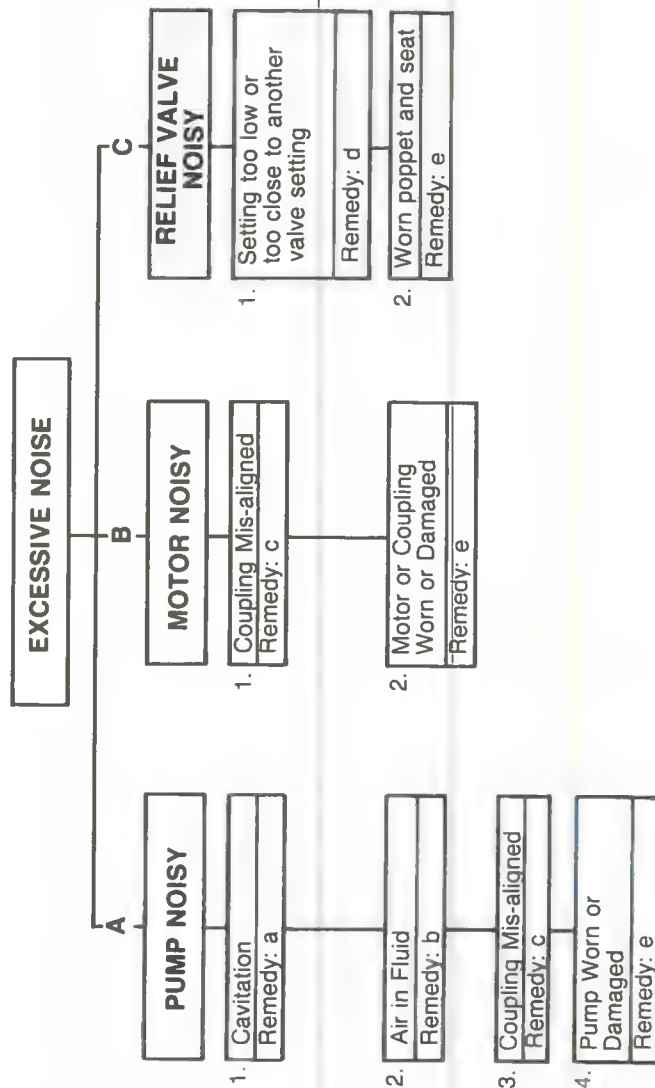
Simply these:

- A. Maintaining a clean sufficient quantity of hydraulic fluid of the proper type and viscosity.
- B. Changing filters and cleaning strainers.
- C. Keeping all connections tight, but not to the point of distortion, so that air is excluded from the system.

TROUBLE-SHOOTING GUIDES

The following charts are arranged in five main categories. The heading of each one is an effect which indicates a malfunction in the system. For example: if a pump is exceptionally noisy, refer to Chart I titled EXCESSIVE NOISE. The noisy pump appears in Column A under the main heading. In Column A there are four probable causes for a noisy pump. The causes are sequenced according to the likelihood of happening or the ease of checking it. The first cause is cavitation and the remedy is "a". If the first cause does not exist, check for cause number 2, etc.

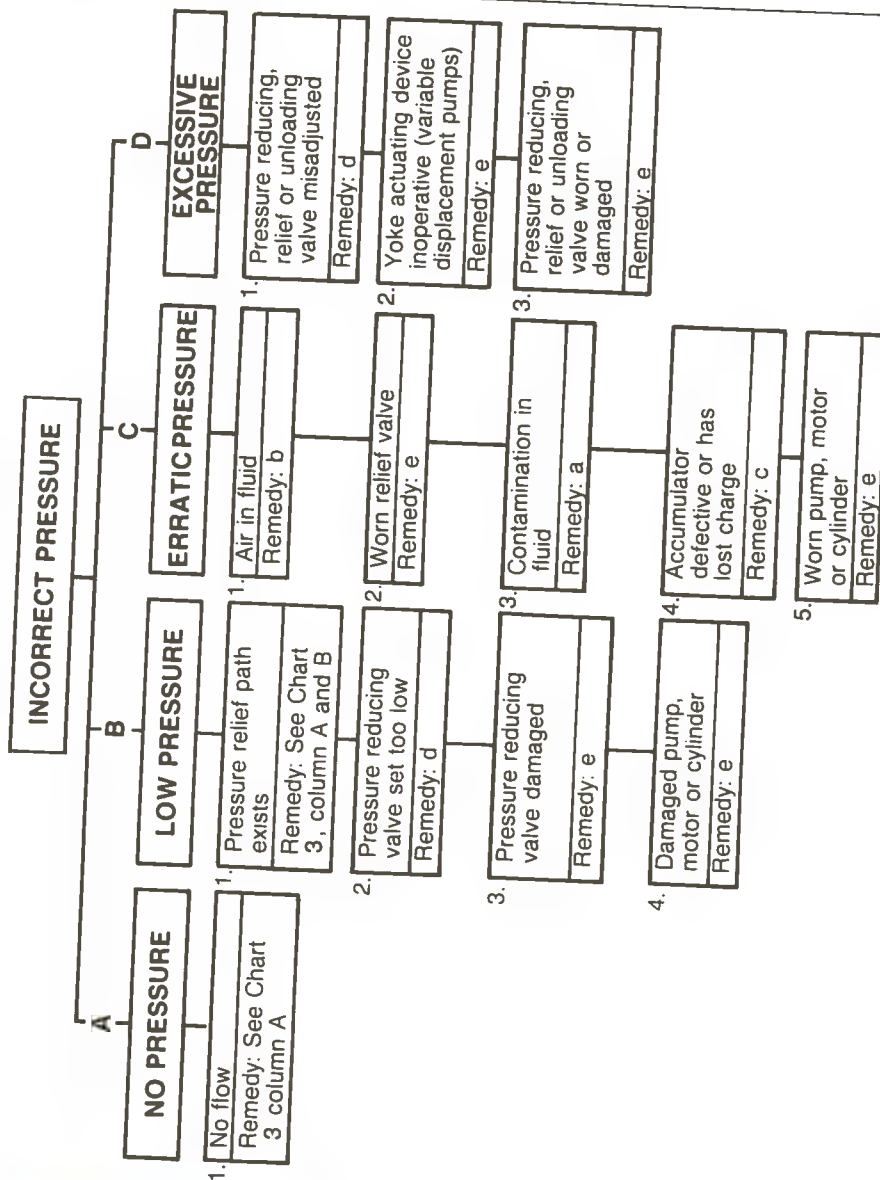
CHART 1



REMEDIES:

- a. Any or all of the following: Replace dirty filters - Wash strainers in solvent compatible with system fluid - Clean clogged inlet line - Clean or replace reservoir breather vent - Change system fluid - Change to proper pump drive motor speed - Overhaul or replace supercharge pump - Fluid may be too cold.
- b. Any or all of the following: Tighten leaking connections - Fill reservoir to proper level (with rare exception all return lines should be below fluid level in reservoir) - Bleed air from system - Replace pump shaft seal (and shaft if worn at seal journal).
- c. Align unit and check condition of seals, bearings and coupling.
- d. Install pressure gauge and adjust to correct pressure.
- e. Overhaul or replace.

CHART 4



REMEDIES:

- a. Replace dirty filters and system fluid.
- b. Tighten leaking connections (fill reservoir to proper level and bleed air from system).
- c. Check gas valve for leakage - Charge to correct pressure - Overhaul if defective.
- d. Adjust.
- e. Overhaul or replace.

CHART 3

REMEDIES:
a. Any or all of the following: Replace dirty filters - Clean clogged inlet line - Clean or replace reservoir breather vent - Fill reservoir to proper level - Overhaul or replace supercharge pump.
b. Tighten leaking connections.
c. Check for damaged pump or pump drive - replace and align coupling.
d. Adjust.
e. Overhaul or replace.
f. Check position of manually operated controls - Check electrical circuit on solenoid operated controls - Repair or replace pilot pressure pump.
g. Reverse rotation.
h. Replace with correct unit.

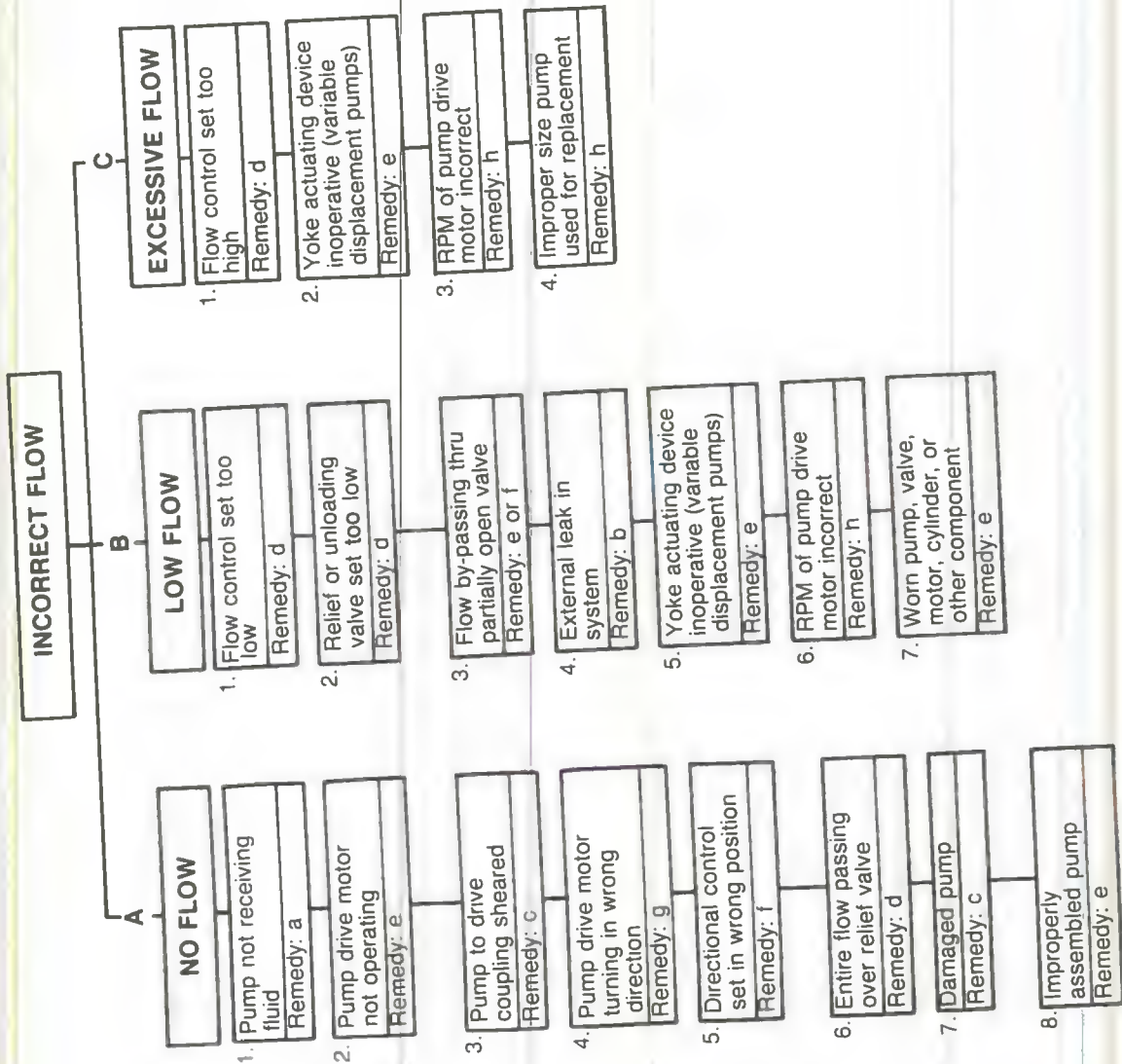
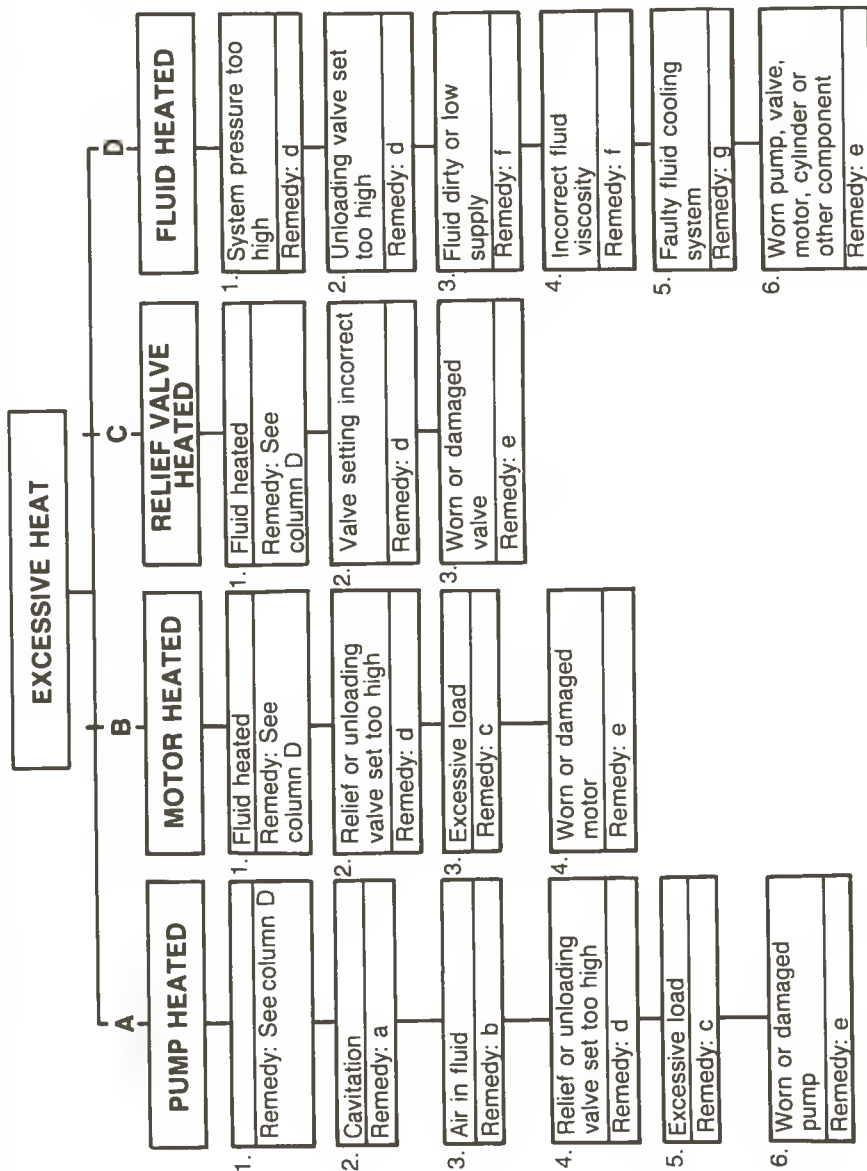


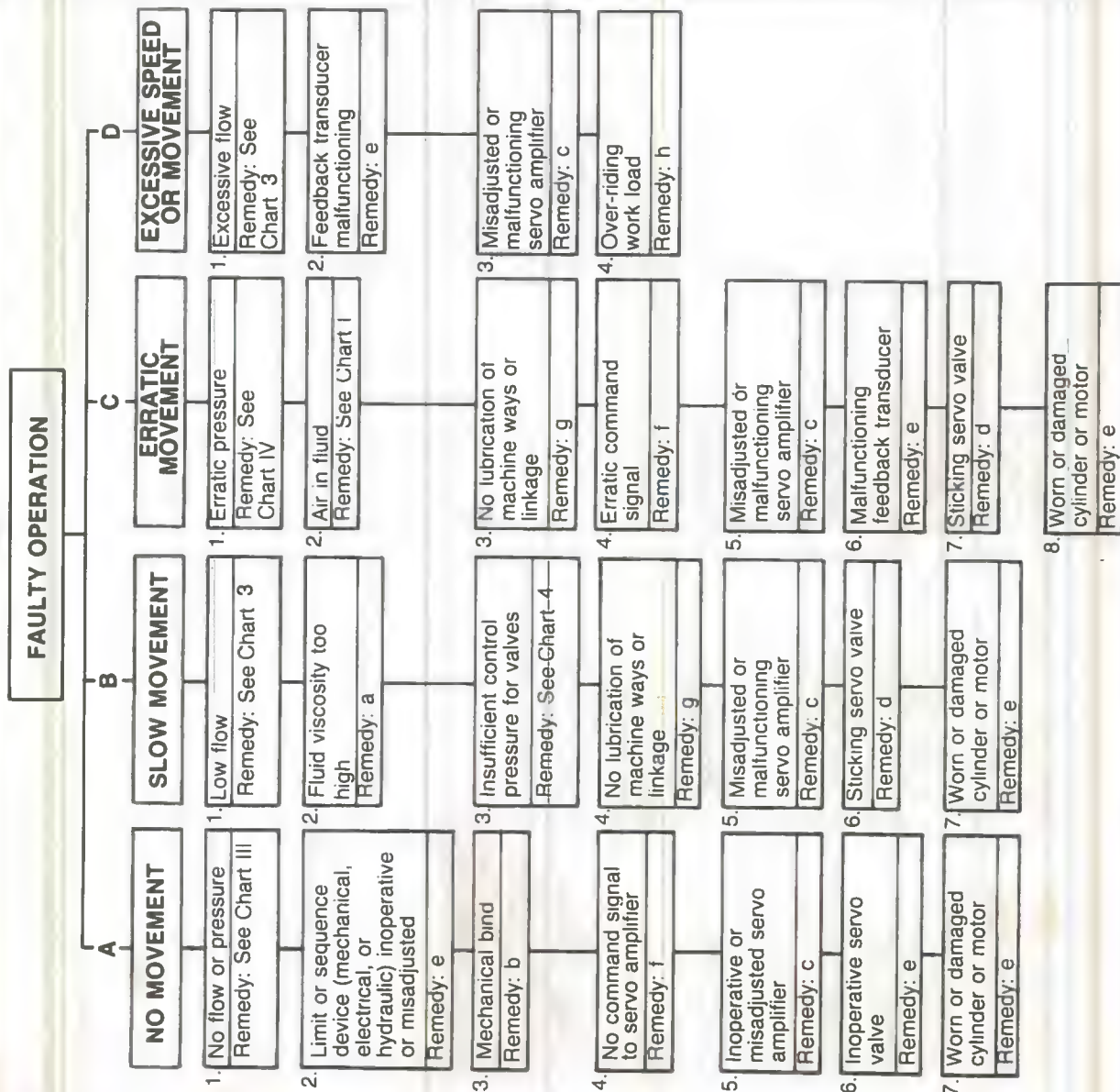
CHART 2



REMEDIES:

- a. Any or all of the following: Replace dirty filters - Clean clogged inlet line - Clean or replace reservoir breather vent - Change system fluid - Change to proper pump drive motor speed - Overhaul or replace supercharge pump.
- b. Any or all of the following: Tighten leaking connections - Fill reservoir to proper level (with rare exception all return lines should be below fluid level in reservoir) - Bleed air from system - Replace pump shaft seal (and shaft if worn at seal journal).
- c. Align unit and check condition of seals and bearings - Locate and correct mechanical binding - Check for work load in excess of circuit design.
- d. Install pressure gauge and adjust to correct pressure (Keep at least 125 PSI difference between valve settings).
- e. Overhaul or replace.
- f. Change filters and also system fluid if of improper viscosity - Fill reservoir to proper level.
- g. Clean cooler and/or cooler strainer - Replace cooler control valve - Repair or replace cooler.

CHART 5



REMEDIES:

- Fluid may be too cold or should be changed to clean fluid of correct viscosity.
- Locate bind and repair.
- Adjust, repair, or replace.
- Clean and adjust or replace - Check condition of system fluid and filters.
- Overhaul or replace.
- Repair command console or interconnecting wires.
- Lubricate.
- Adjust, repair, or replace counterbalance valve.

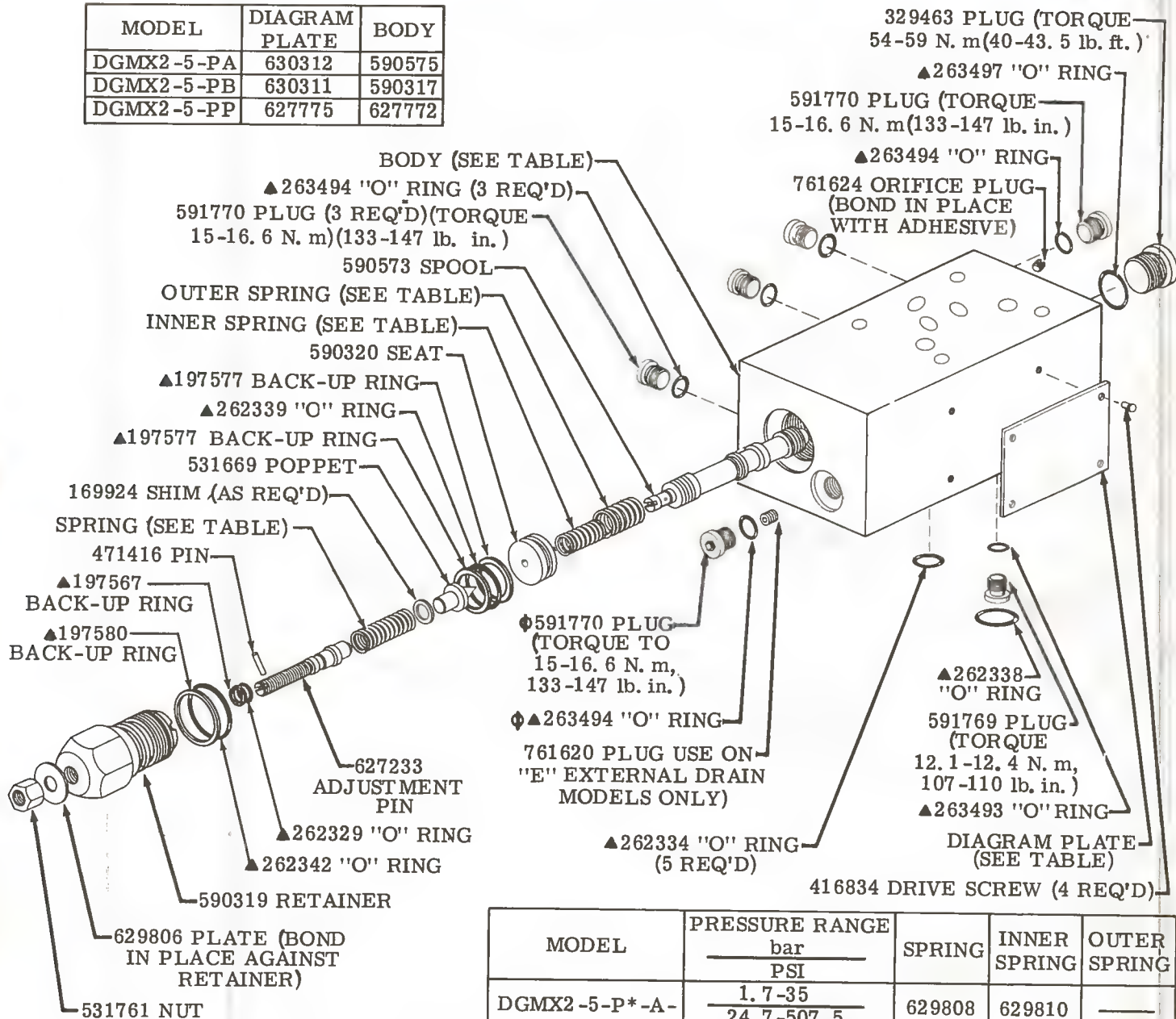
Service Parts Information

VICKERS
A TRIMONA COMPANY

PRESSURE REDUCING MODULE

DGMX2-5-P*-**-W-20

MODEL	DIAGRAM PLATE	BODY
DGMX2-5-PA	630312	590575
DGMX2-5-PB	630311	590317
DGMX2-5-PP	627775	627772



Φ OMIT ON "E" EXTERNAL DRAIN MODELS

▲ INCLUDED IN F3 SEAL KIT 920269

MODEL	PRESSURE RANGE bar PSI	SPRING	INNER SPRING	OUTER SPRING
DGMX2-5-P*-A-	1.7-35 24.7-507.5	629808	629810	—
DGMX2-5-P*-B-	8.5-140 123.3-1015	590321	595526	590322
DGMX2-5-P*-C-	8.5-140 123.3-2030	590574	595526	590322
DGMX2-5-P*-F-	8.5-250 123.3-3625	595527	595526	590322

Vickers, Incorporated
P.O. Box 302
Troy, Michigan 48007-0302

Revised 3-1-85

I-3434-S

MODEL CODE BREAKDOWN

(F3)-DGMX2-5-P*--W-20**

SEALS FOR
MINERAL OIL
AND FIRE
RESISTANT
FLUIDS

DIRECTIONAL
VALVE

MANIFOLD OR
SUBPLATE
MOUNTED

MODULE

PRESSURE REDUCING
OVERLAP VENT
TYPE SPOOL

INTERFACE C. E. T. O. P.
RP35H, SIZE 5
NFPA-D02
(ISO 4401-05)

DESIGN

SCREW AND
LOCKNUT
ADJUSTMENT

E - EXTERNAL DRAIN
(OMIT FOR INTERNAL
DRAIN)

PRESSURE RANGE
A - 1.7 - 35 bar
B - 8.5 - 70 bar
C - 8.5 - 140 bar
F - 8.5 - 250 bar

PILOT CONTROL PORT
A - CYLINDER A PORT
B - CYLINDER B PORT
P - PRESSURE PORT

PORT OPERATED UPON
P - PRESSURE PORT

To insure sustained efficiency and maximum trouble free life of this precision equipment, initial and continuous full flow filtration of the fluid medium is essential. Select and apply filters from the Vickers OFP, OFR, and OFRS series, which are available in 3, 10, and 25 micrometre filtration ratings.

Litho in U. S. A.

Service Parts Information

VICKERS

A TRIMONA COMPANY

INSTA-PLUG CONNECTOR

DG4S*-01**-5*

THE INSTA-PLUG FEATURE CAN BE ADDED TO ANY DG4S*-01**-5* DIRECTIONAL VALVE. INSTA-PLUG FEATURE VALVES ARE ASSIGNED A PA OR PB PREFIX TO THE MODEL CODE. PA INDICATES THE PLUG IS INCLUDED AND PB INDICATES THAT BOTH THE PLUG AND RECEPTACLE ARE INCLUDED. EXAMPLE: PADG4S4-012-5* OR PBDG4S4-012-5*. INSTA-PLUG CONVERSION KIT ONLY ARE SHOWN ON THIS DRAWING. REFER TO THE BASIC VALVE PARTS DRAWING FOR OTHER INFORMATION.

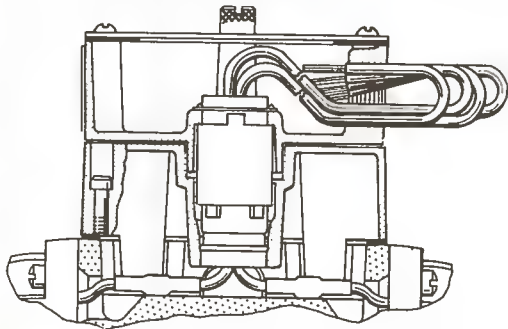
WIRING NOTE:

CONNECT WHITE WIRES TO "A" SOLENOID AND BLACK WIRES TO "B" SOLENOID.

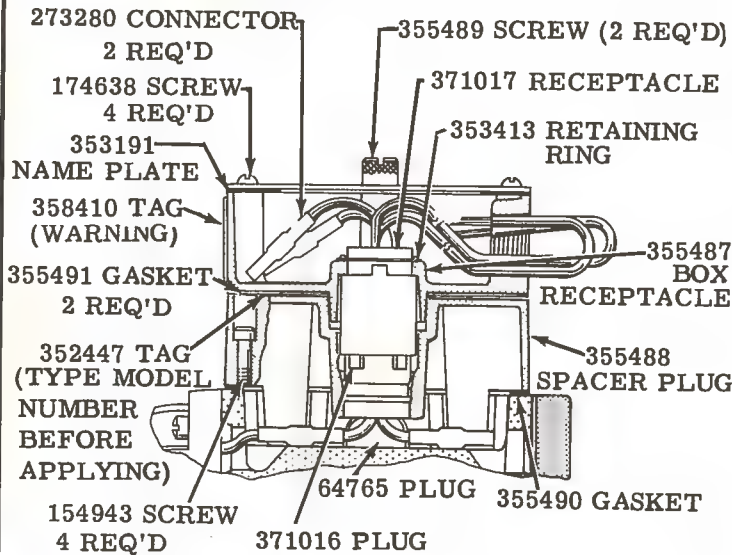
NOTE:

ALL VIEWS SHOWN ARE FROM DIAGRAM PLATE SIDE OF VALVE.

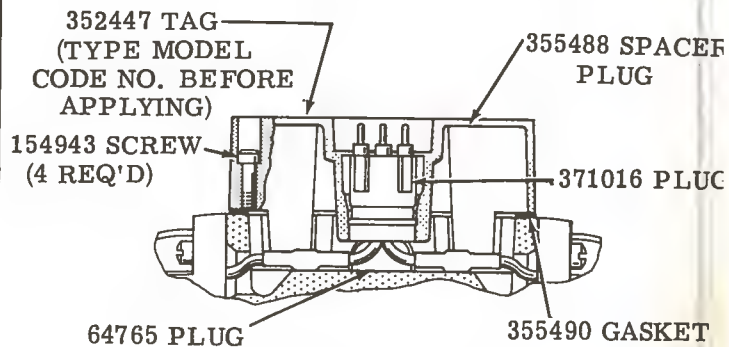
WIRING CONNECTIONS FOR DOUBLE SOLENOID MODELS



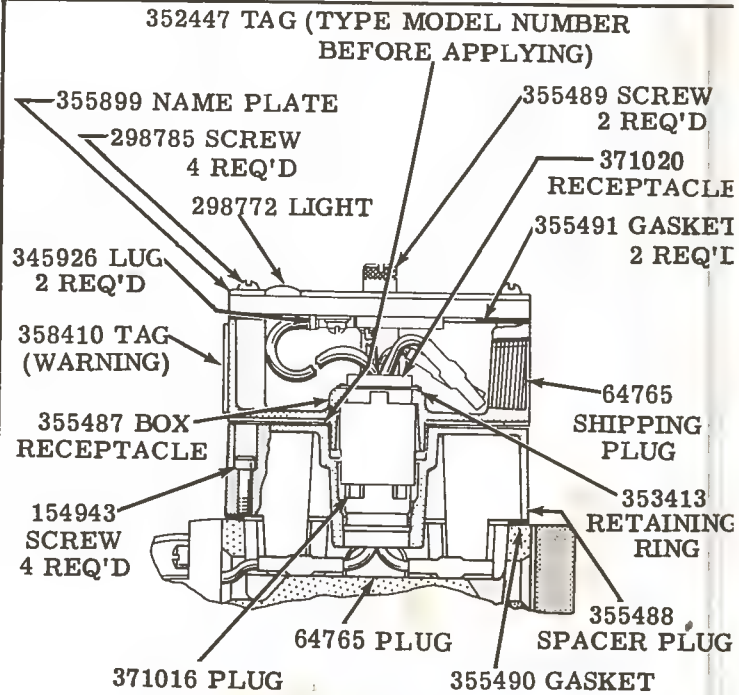
WIRING CONNECTIONS FOR SINGLE SOLENOID MODELS



PLUG & RECEPTACLE KIT 942064



PLUG KIT 942063

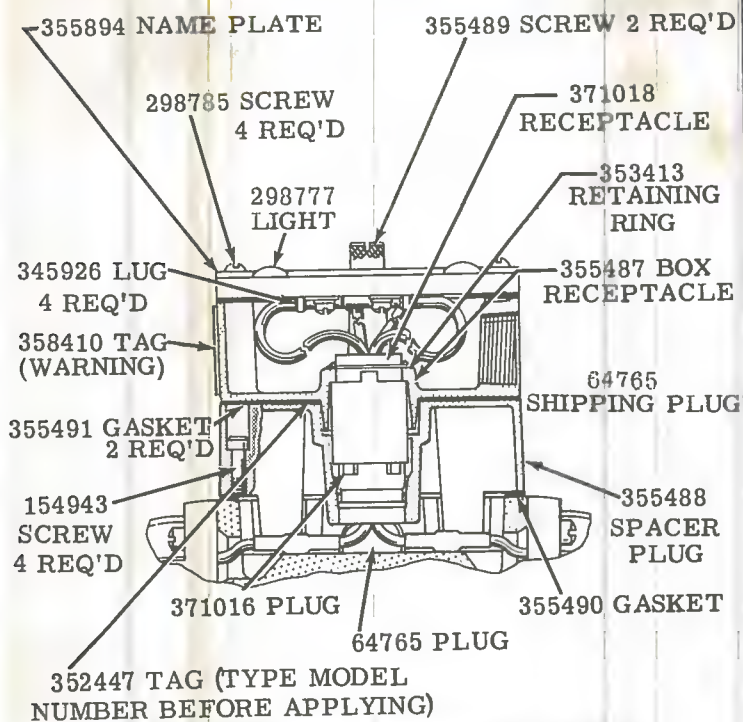


PLUG & RECEPTACLE WITH SINGLE INDICATOR LIGHT IS NO LONGER AVAILABLE ASA KIT.

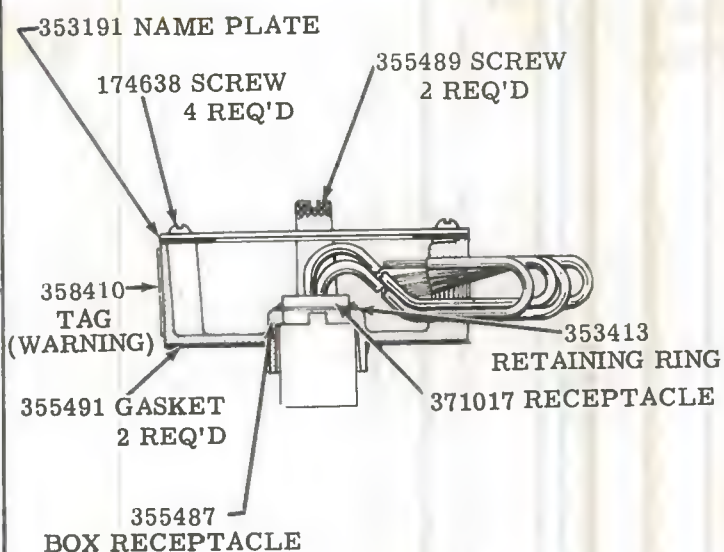
Vickers, Incorporated
P.O. Box 302
Troy, Michigan 48007-0302

Revised 11-1-85

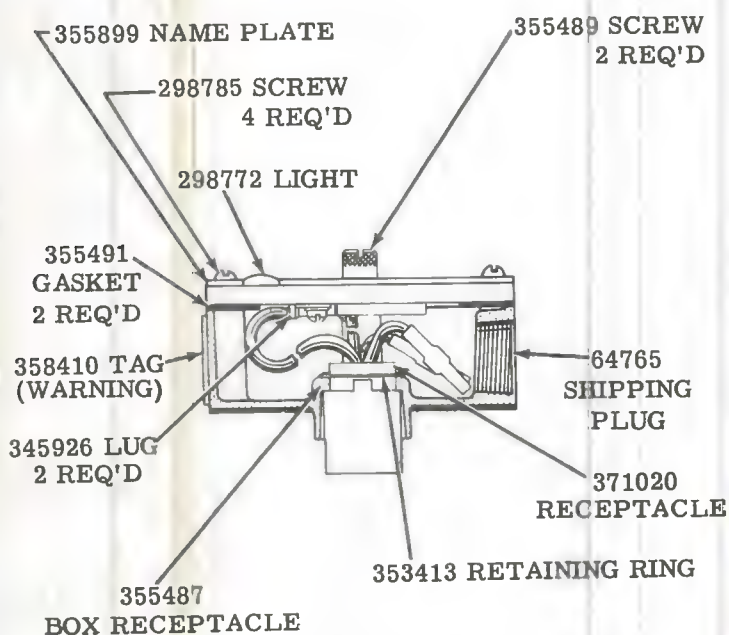
I-3487-S



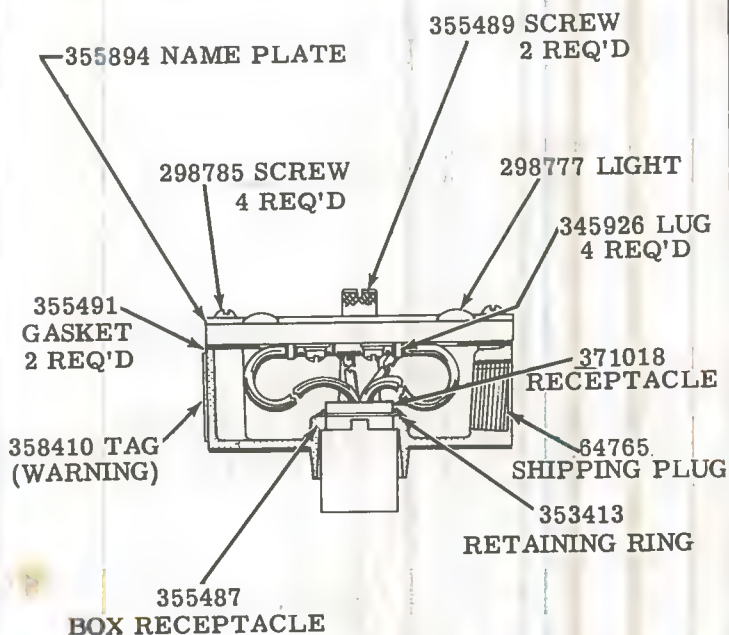
PLUG & RECEPTACLE WITH DOUBLE
INDICATOR LIGHT KIT
942066 (100 thru 127 V. A. C.)
941182 (192 thru 233 V. A. C.)



RECEPTACLE KIT 942067



RECEPTACLE WITH SINGLE IN-
DICATOR LIGHT IS NO LONGER
AVAILABLE AS A KIT.



RECEPTACLE WITH DOUBLE
INDICATOR LIGHT KIT
942069 (100 thru 127 V. A. C.)
941183 (192 thru 233 V. A. C.)

For satisfactory service life of these components, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from Vickers OFP, OFR, and OFRS series are recommended.

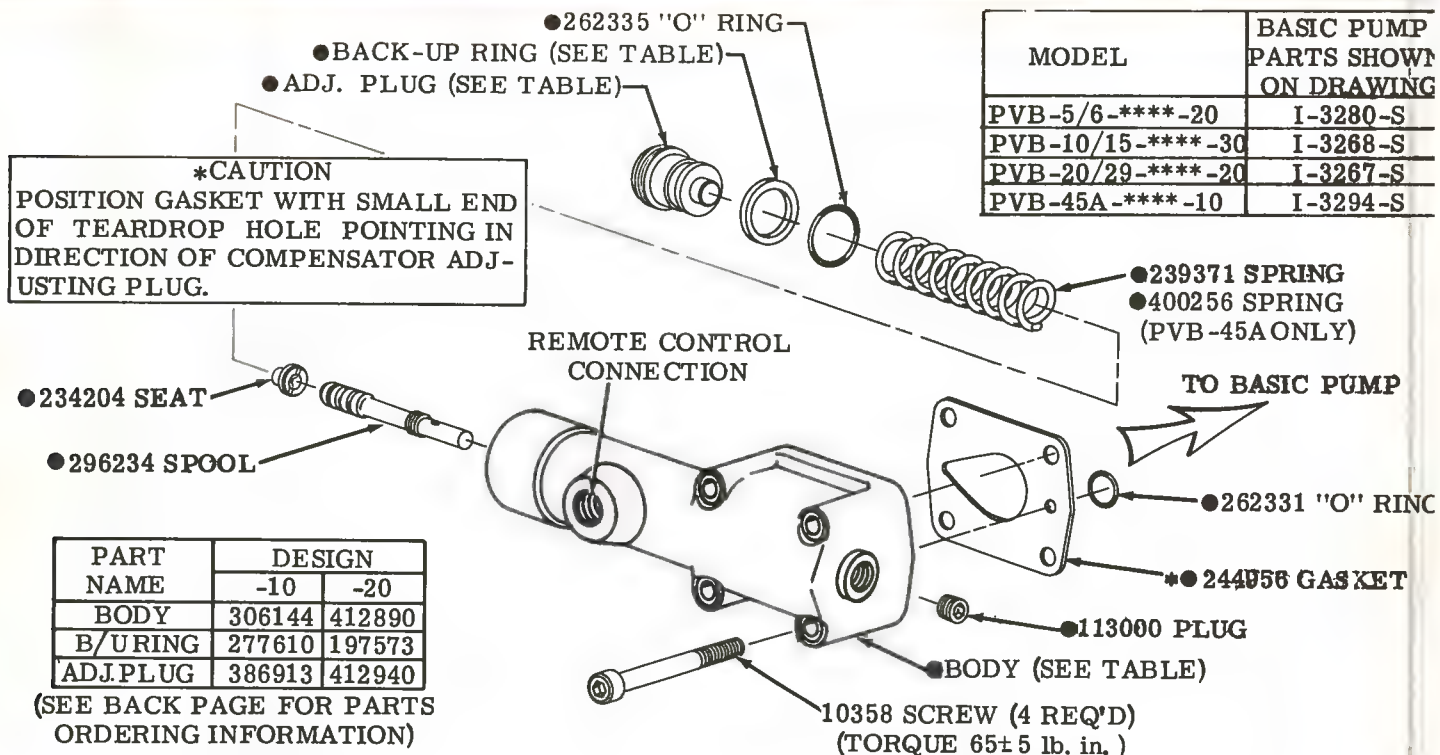
Litho in U. S. A.

Service Parts Information

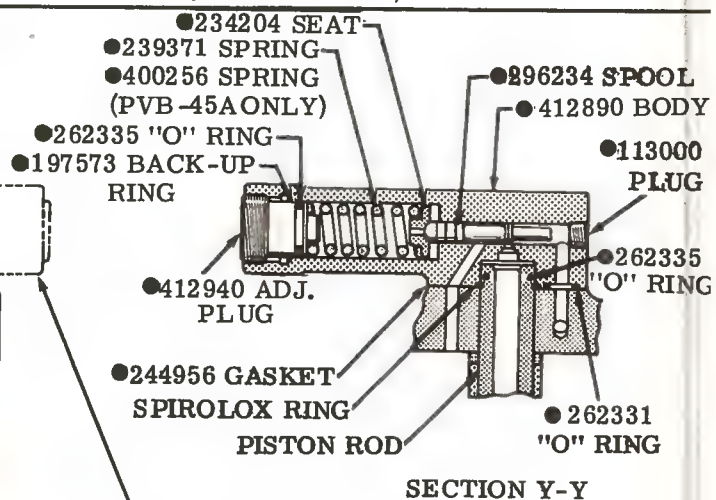
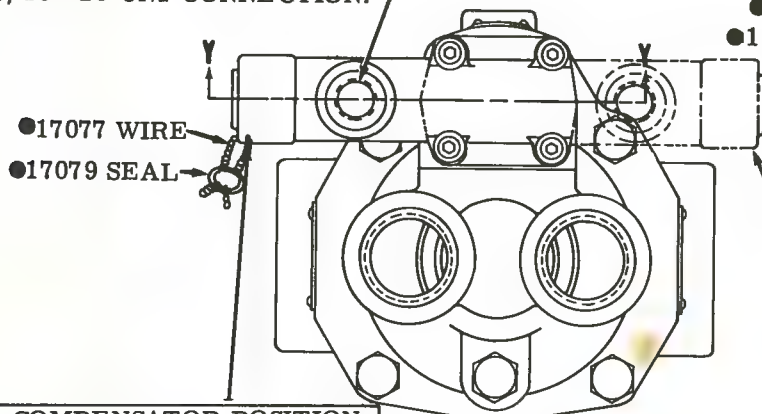
HYDRAULIC REMOTE PRESSURE COMPENSATOR

PVB-5/6-**-CG-10/-20
PVB-10/15-**-CG-10/-20
PVB-20/29-**-CG-10/-20
PVB-45A-CAG-10/-20

VICKERS
A TRIMONA COMPANY



FOR -20 DESIGN MODELS
CONNECT TO PRESSURE
CONTROL (SUCH AS C-175)
7/16"-20 UNF CONNECTION.



COMPENSATOR POSITION FOR -20 DESIGN MODELS	
PVB-5/6 LEFT HAND (CCW) SHAFT ROTATION	
PVB-10/15 RIGHT HAND (CW) SHAFT ROTATION	
PVB-20/29/45A R.H. & L.H.	

INCLUDED IN -20 DESIGN COMPENSATOR KITS	
PVB-5/6, 10/15, 20/29	942480
PVB-45A	942444

COMPENSATOR POSITION FOR -20 DESIGN MODELS	
PVB5/6 RIGHT HAND (CW) SHAFT ROTATION. AVAILABLE ONLY WITH ADJ. MAXIMUM STOP FEATURE. (CCG).	
PVB10/15 LEFT HAND (CCW) SHAFT ROTATION. (SHOWN).	

COMPENSATOR ADJUSTMENT PROCEDURE

1. TURN REMOTE PRESSURE CONTROL (SUCH AS C-175) TO MINIMUM SETTING.
2. TURN COMPENSATOR ADJUSTMENT PLUG TO MINIMUM PRESSURE (250 PSI OR HIGHER).
3. FULL PRESSURE RANGE CAN NOW BE OBTAINED WITH THE REMOTE PRESSURE CONTROL.

MODEL CODE BREAKDOWN

REFER TO PARTS DRAWINGS TABULATED ON THE FRONT PAGE FOR MODEL CODE INFORMATION. ALL MODEL CODE DATA PERTAINS EXCEPT FOR THE CONTROL. C(*) IS REPLACED BY "CG" WHEN THE REMOTE CONTROL COMPENSATOR IS USED.

PARTS ORDERING INFORMATION

THE -10 AND -20 DESIGNS ARE SHOWN ON THIS DRAWING FOR COMPARISON PURPOSES. WHEN ORDERING REPLACEMENT PARTS FOR THE CG COMPENSATOR, NOTE THE -10 DESIGN PARTS ARE SUPERSEDED BY THE -20 DESIGN PARTS LISTED IN THE TABLE. ALL OTHER PARTS ARE COMMON TO THE -10 AND -20 DESIGN.

For satisfactory service life of these components in industrial applications, use full flow filtration to provide fluid which meets ISO cleanliness code 16/13 or cleaner. Selections from Vickers OFP, OFR, and OFRS series are recommended.

Service Parts Information

VICKERS

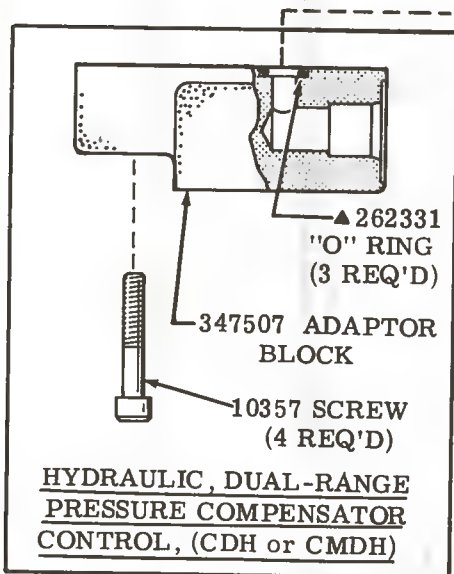
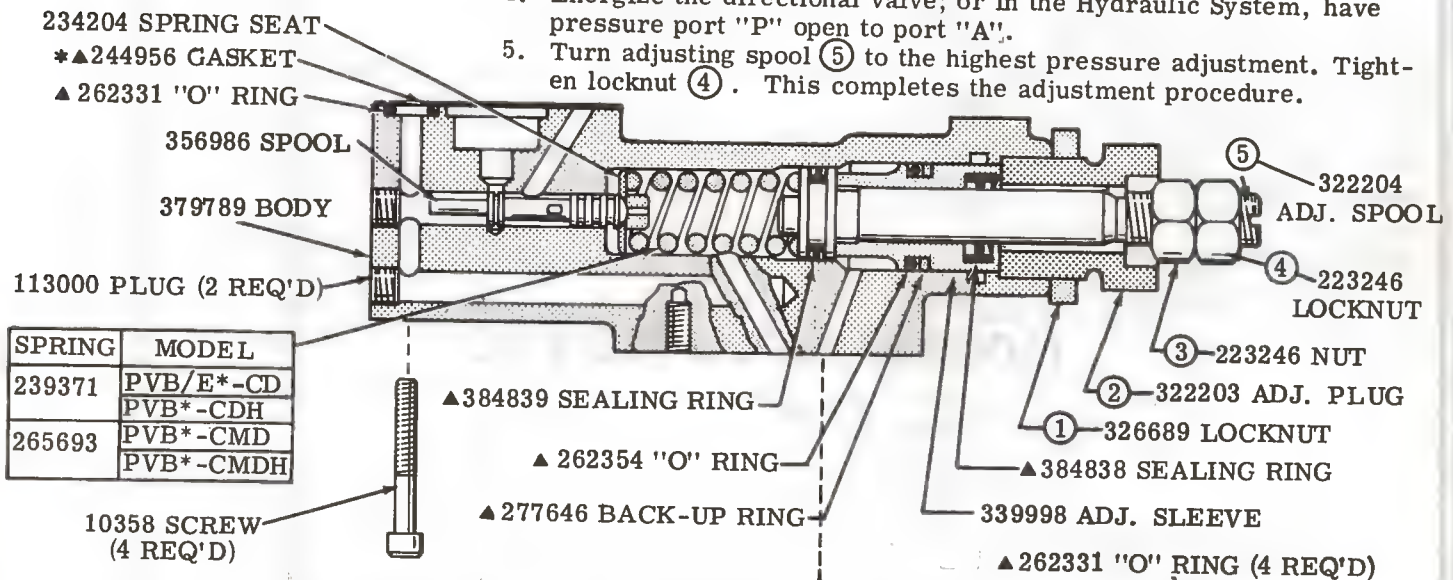
A TRIMONA COMPANY

**DUAL RANGE &
ADJ. MAX. STOP
COMPENSATOR**

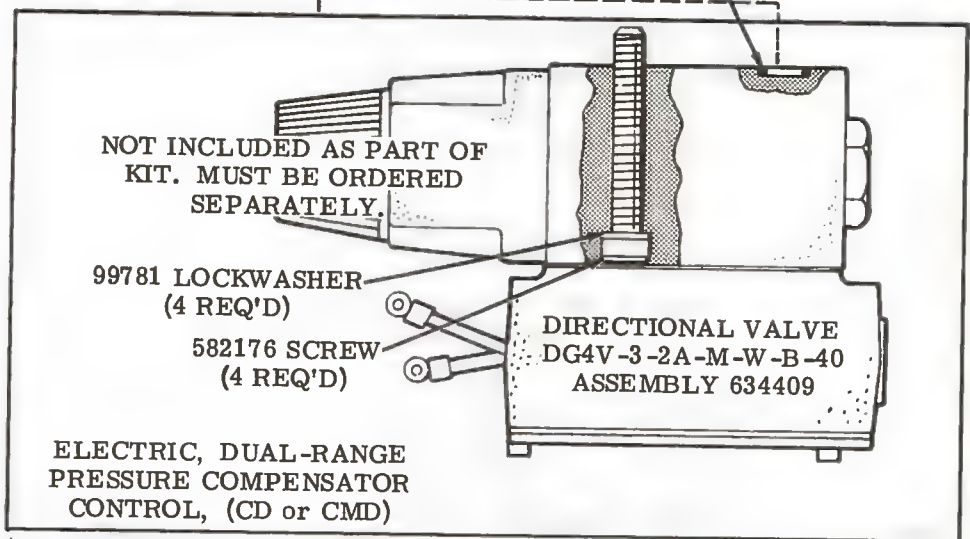
**PVB/E*-(F)*S(F)*(Y)*-C(M)D-20
PVB*-(F)*S(F)*(Y)*-C(M)DH-11**

***CAUTION**
Position gasket with small end of
teardrop hole pointing in direction
of compensator adjusting plug.

- CD, CMD, CDH, CMDH, CONTROL ADJUSTMENT PROCEDURE**
1. Loosen locknuts ① and ④.
 2. Turn adjusting spool ⑤ until nut ③ is bottomed against adjusting plug ②. Adjusting spool threads will be full extended.
 3. With the directional valve de-energized; or in the Hydraulic System having the pressure port "P" blocked and port "B" open to port "T", adjust the lowest pressure setting by turning adjusting plug ②. Tighten locknut ① after adjustment is completed.
 4. Energize the directional valve; or in the Hydraulic System, have pressure port "P" open to port "A".
 5. Turn adjusting spool ⑤ to the highest pressure adjustment. Tighten locknut ④. This completes the adjustment procedure.



▲ INCLUDED IN
919621 F3 SEAL KIT



**COMPENSATORS/A KITS INCLUDE
ALL PARTS SHOWN EXCEPT
DIRECTIONAL VALVE**

COMPENSATOR S/A KIT	
CMD-941033	CMDH-942114
CD-941032	CDH-942115

Vickers, Incorporated
P.O. Box 302
Troy, Michigan 48007-0302

Revised 1-1-88

I-3255-S

PVB*-(F)*S(F)*(Y)*-C(M)C-*
PVE19*-Q****-3*-C**-10/11

COMPENSATOR POSITION SHOWN FOR:
PVB5/6-L. H. Shaft Rotation
PVB10/15 & PVE19 R. H. Shaft Rotation
PVB20/29-R. H. or L. H. Shaft Rotation
On PVB5/6/10/15 & PVE19 models, if the shaft rotation is changed from that shown above, the compensator must be rotated 180°.

244956 GASKET
*CAUTION
Position gasket with small end of teardrop hole pointing in direction of compensator adjusting plug.

*244956 GASKET

All part numbers shown included in maximum stop subassembly.

262331 "O" RING (2 REQ'D)

262327 "O" RING

1450 NUT

277602 BACK-UP RING

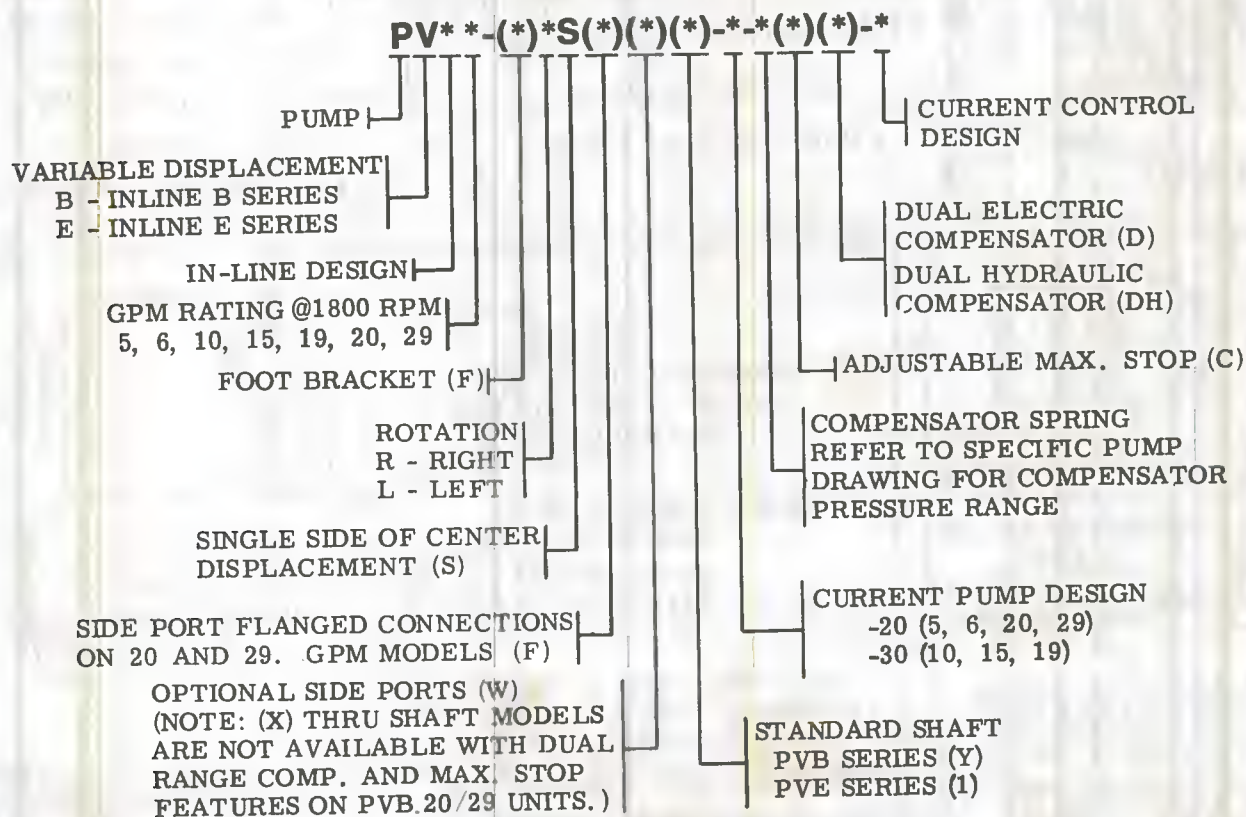
10932 SCREW (4 REQ'D)
(TORQUE 60-70 lb. in.)

MODEL	MAX. STOP S/A NO.	ADJ. ROD	ADAPTER BLOCK
PVB5-*LS*-20-C(M)C-*	942188	354573	354578
PVB6-*LS*-20-C(M)C-*			
PVB5-*RS*-20-C(M)C-*	942189	354574	354579
PVB6-*RS*-20-C(M)C-*			
PVB1*-*LS*-3*-C(M)C-*	942190	354575	354578
PVB1*-*RS*-3*-C(M)C-*	942191		
PVE19L-Q****-3*-C(*)C-*	926294	354575	354579
PVE19R-Q****-3*-C(*)C-*			
PVB2*-*LS*-*0-C(M)C-*	942192		354578
PVB2*-*RS*-*0-C(M)C-*			

Included in Max. Stop S/A but not shown
200087 O'Ring, 567707 and 567848 sleeve's.
Sleeve 567848 (color coded red) used only on CCVP models.

To assist initial priming, manual adjustment control setting must be at least 40% of maximum flow position. Maximum flow position occurs when rod is fully extended.

MODEL CODE BREAKDOWN



For satisfactory service life of these components, use full flow filtration to provide fluid which meets ISO cleanliness code 16/13 or cleaner. Selections from OFP, OFR and OFRS filter series are recommended.

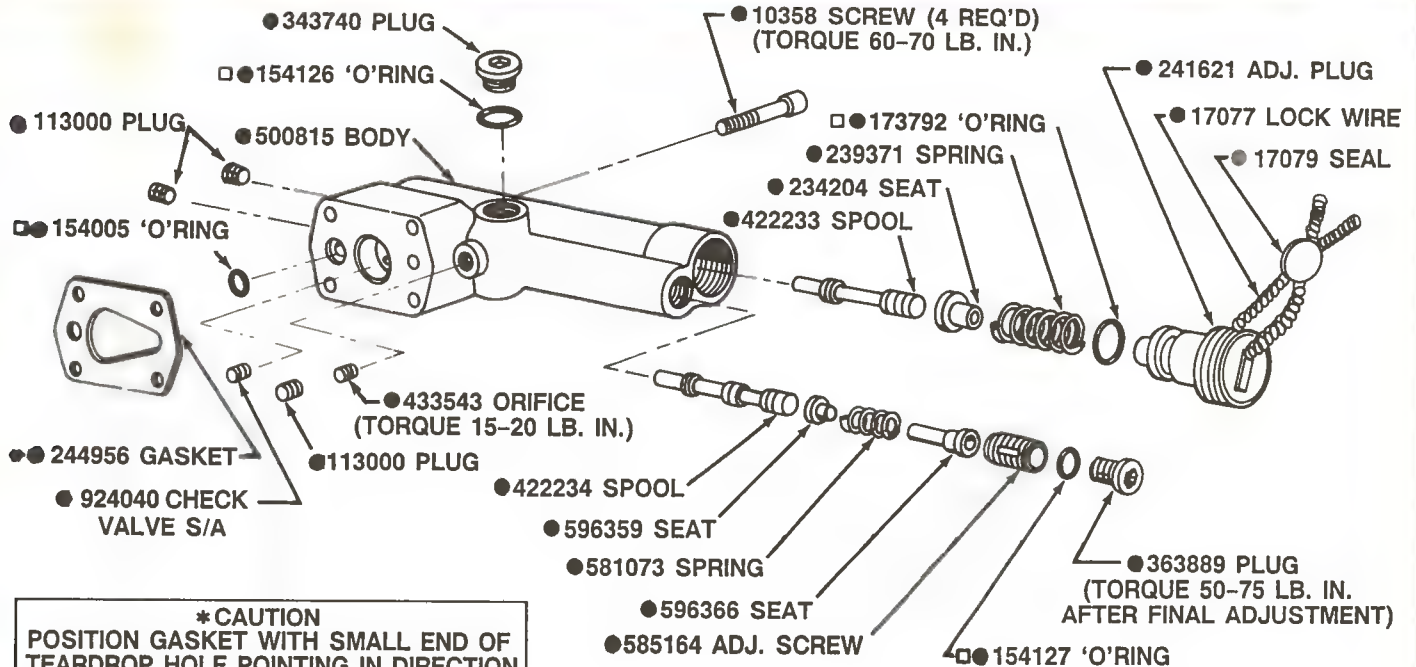
Litho in U.S.A.

Service Parts Information

VICKERS
A TRIMONA COMPANY

PRESSURE LIMITING LOAD SENSING COMPENSATOR

PVB-5 Thru 29-CVP-12



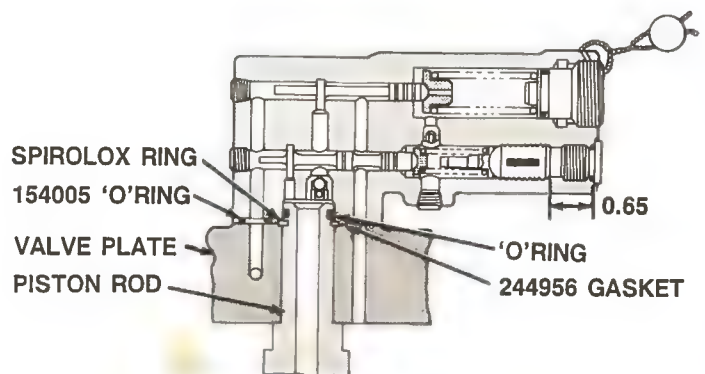
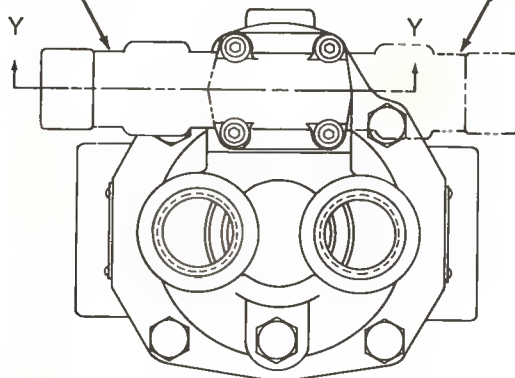
*** CAUTION**
POSITION GASKET WITH SMALL END OF
TEARDROP HOLE POINTING IN DIRECTION
OF COMPENSATOR ADJUSTING PLUGS.

CVP COMPENSATOR MOUNT
FOR PVB-10/15/20/29 PUMP
WITH R.H. SHAFT ROTATION
OR PVB-5/6 PUMP WITH L.H.
SHAFT ROTATION

CVP COMPENSATOR MOUNT
FOR PVB-10/15/20/29 PUMP
WITH L.H. SHAFT ROTATION
OR PVB-5/6 PUMP WITH R.H.
SHAFT ROTATION

● INCLUDED IN CVP-12
COMPENSATOR KIT 924069

□ NOTE
REPLACEMENT SEALS FOR THE CVP
COMPENSATOR ARE INCLUDED IN
BASIC PUMP SEAL KIT.



SECTION Y-Y

MODEL	BASIC PUMP PARTS DRAWING
PVB-5/6	I-3280-S, I-3261-S
PVB-10/15	I-3268-S, I-3282-S
PVB-20/29	I-3267-S, I-3293-S

CVP-12 Compensator Adjustment Procedure

Refer to front page and test circuit diagram. Perform the following steps:

1. Turn pressure limiting adjusting plug 241621 clockwise until seated. Turn in load sensing adjusting screw 585164 to approximately 0.65 inch. See sectional view Y-Y.
2. Operate the pump at the shaft speed (rpm) indicated in the Table 1 below. Warm up system fluid to 110–130° F. Maintain 0–5 psi at pump inlet.
3. Adjust valve 'A' to obtain 104 bar (1500 psi) at 'P2'.
4. Adjust valve 'B' to obtain a pump flow set point that is specified in Table 1.

MODEL	RPM	PUMP FLOW SET POINT	ΔP DIFF. @ 95% FLOW
PVB5	2400	4 gpm	+5 / -15
PVB6	2400	4 gpm	+5 / -15
PVB10	2400	6 gpm	+5 / -15
PVB15	2400	10 gpm	+5 / -15
PVB20	2000	12 gpm	+5 / -15
PVB29	2000	15 gpm	+5 / -15

Table 1.

5. Turn load sensing adjustment screw 585164 until 8.8–10.2 bar (140–180 psi) pressure dif-

ferential is obtained between 'P1' and 'P2'.

6. Vary the pump outlet flow from 1.5 gpm to the pump flow set point with valve 'B'. A differential pressure reading should be within the value shown in Table 1. Differential pressure is defined as the pressure between the compensator cracking pressure (pressure at which the outlet flow equals 95% of full flow) and the pressure at the pump flow set point.

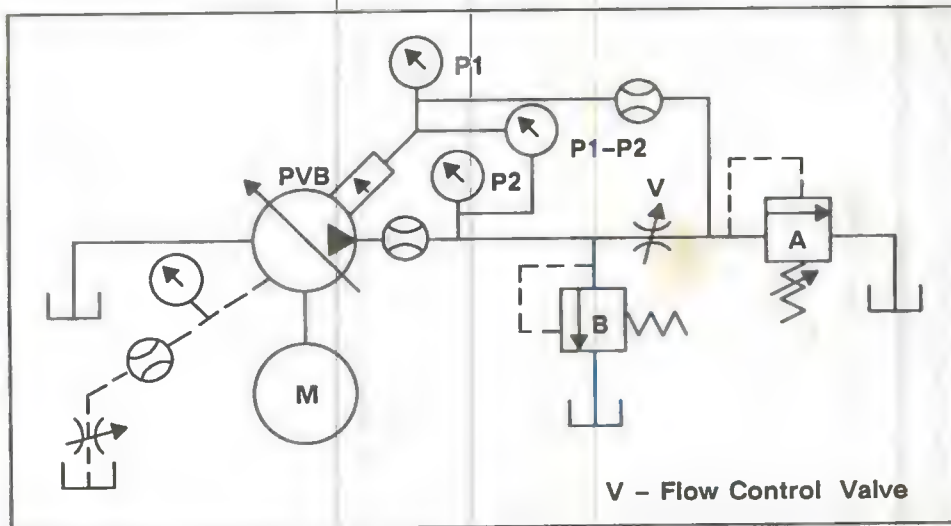
7. Turn pressure limiter adjustment plug 241621 counterclockwise until approximately .60 inch of threads are exposed. Close valve 'A'. Minimum pressure at 'P2' must not exceed 250 psi for PVB5/6/20/29 units, or 350 psi for PVB10/20 units.

8. Turn the pressure limiter plug clockwise to retract the yoke to flow cutoff position (minimum stroke). Pressure at 'P2' must not exceed 2000 psi for PVB6/15/29 units, or 3000 psi for PVB5/10/20 units.

9. Shut down the system after compensator adjustments are completed. Install 154127 'o'ring on 363889 plug. Install the plug into end of compensator body and tighten to 50–75 lb. in.

10. Use a .089 drill bit and drill a hole through the compensator body and pressure limiter adjustment plug as shown in sectional view Y-Y.

11. Install lock wire into hole. Twist the wire and install the seal on the lock wire. Squeeze the seal to the lock wire with a suitable tool.



Test Circuit Diagram

For satisfactory service life of these components, use full flow filtration to provide fluid which meets ISO cleanliness code 16/13 or cleaner. Selections from Vickers OFP, OFR and OFRS filter series are recommended.

Litho in U.S.A.

Service Parts Information

Dual Feed
Control Panels

CPGD-06-*A-12
CPGD-06-*AA-12



Vickers, Incorporated

1401 Crooks Road
Troy, Michigan 48084

Revised 12-1-84 I-3609-S

CONVERSION OF A SINGLE FEED PANEL TO A DUAL FEED PANEL IS ACCOMPLISHED BY INSTALLING CONVERSION KIT 942250. THE KIT CONTAINS THE FOLLOWING PARTS:

PART NO.	NAME	QTY.
155091	BACK-UP RING	1
177537	SPRING	1
200978	SPRING	1
207638	PLUG	1
207772	SHAFT	1
207775	INDICATOR	1
207782	SET SCREW	1
224347	ROD	1
224352	THROTTLE (COARSE)	1
262330	"O" RING	1
349143	DIAL S/A	1
349458	PAWL	1
375643	COVER PLATE	1

WITH 207772 SHAFT TURNED IN, ADJUST 207638 POSITIONING PLUG IN DIAL SO THAT "O" ON DIAL LINES UP WITH POINTER ON COVER PLATE WHEN DIAL IS ASSEMBLED ON SHAFT. LOCK SECURELY WITH 207782 SET SCREW. INSERT 207775 RANGE INDICATOR SO THE LETTER "A" MAY BE SEEN AT RANGE OPENING IN COVER PLATE. REPEAT PROCEDURE-DUAL FEED PANEL.

*OPTIONAL SPACERS (PART NO. 211026) ARE AVAILABLE TO PROVIDE THE FOLLOWING MAXIMUM FLOW RATES:

NUMBER OF SPACERS	APPROXIMATE MAXIMUM CONTROLLED FLOW (CU. IN./MIN.)	
	FINE FEED	COARSE FEED
4	100	400
3	300	800
2	700	1200
1	1100	1400

■ THESE PARTS ARE USED ONLY ON THE SINGLE FEED PANEL CPGD-06-*A-12. THEY MUST BE REMOVED IF THE PANEL IS BEING CONVERTED TO DUAL FEED TYPE.

COVER PLATE	MODEL
375647	■ CPGD-06-A-12
375643	CPGD-06-AA-12

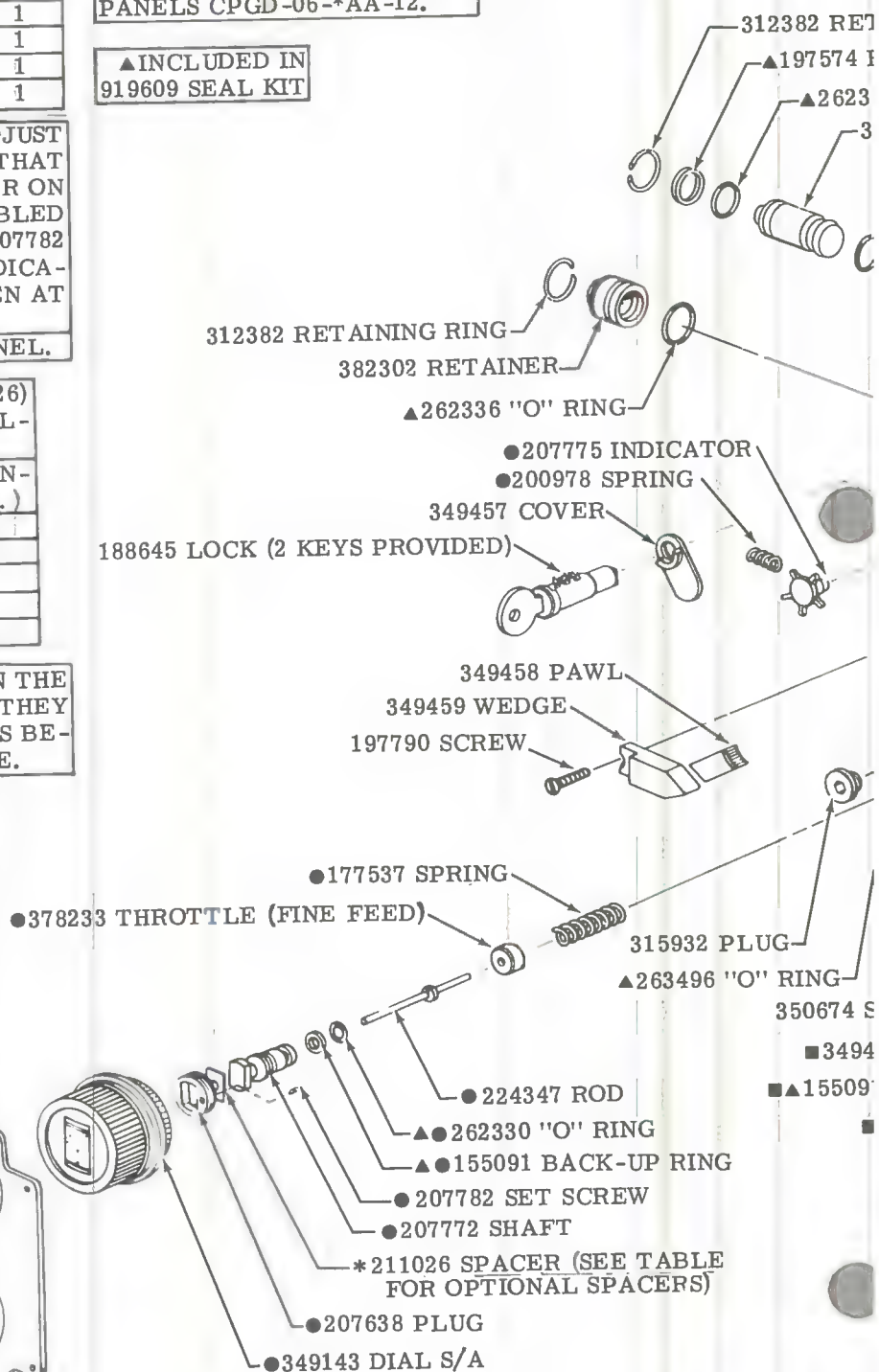
AX-36212 SCREW
(7 REQ'D)

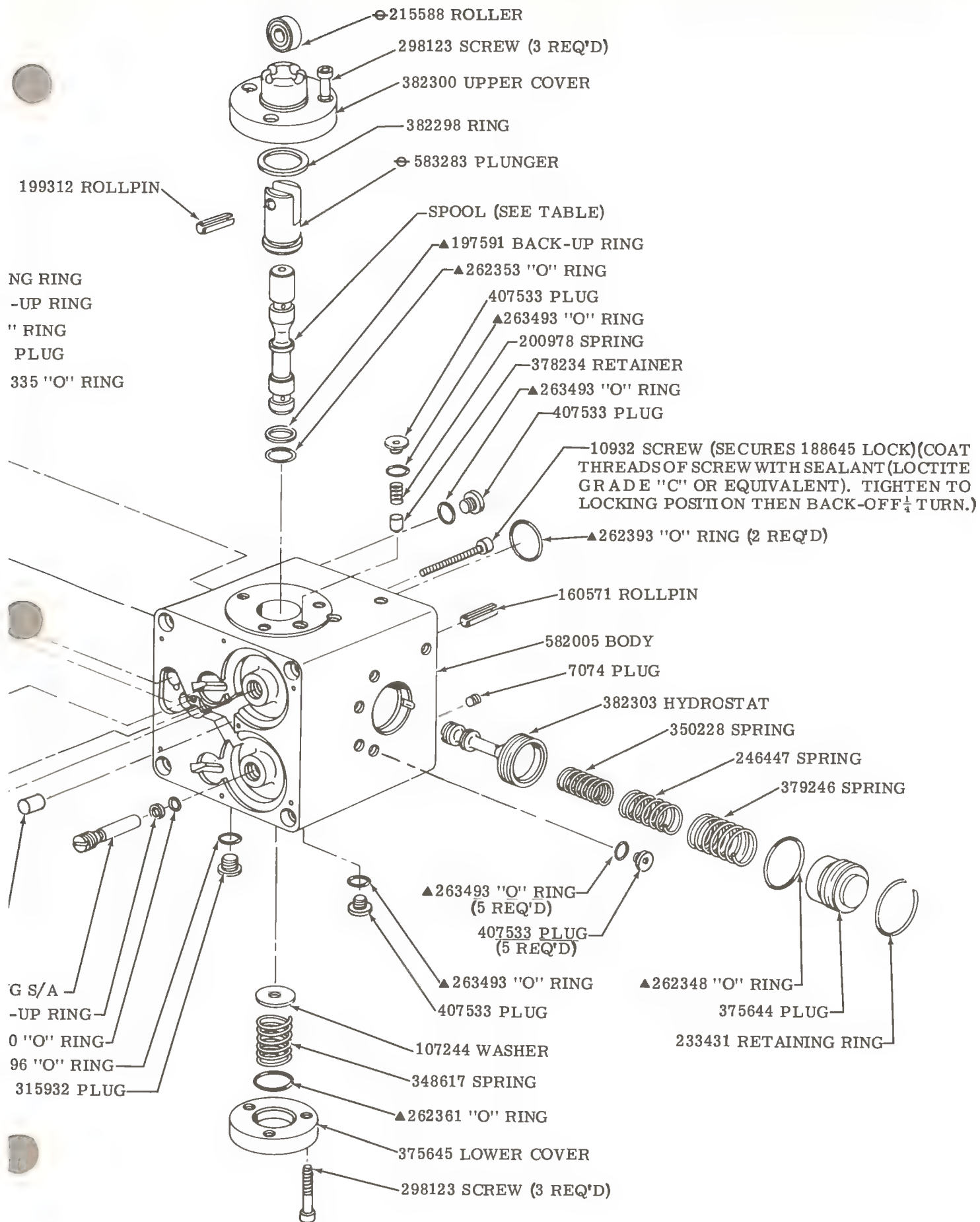
● 215588 ROLLER AND 583283 PLUNGER CAN BE POSITIONED AT RIGHT ANGLES TO THE MOUNTING FACE. TAP OUT ROLL PIN, REMOVE ROLLER AND TURN PLUNGER CLOCKWISE (CW) 90°. INSTALL ROLLER AND PIN. (SEE MODEL CODE)

SPOOL	RATED FLOW	MODEL
374889	10 GPM	CPGD-06-10A(A)-12
374890	15 GPM	CPGD-06-15A(A)-12
374891	20 GPM	CPGD-06-20A(A)-12
374892	30 GPM	CPGD-06-30A(A)-12

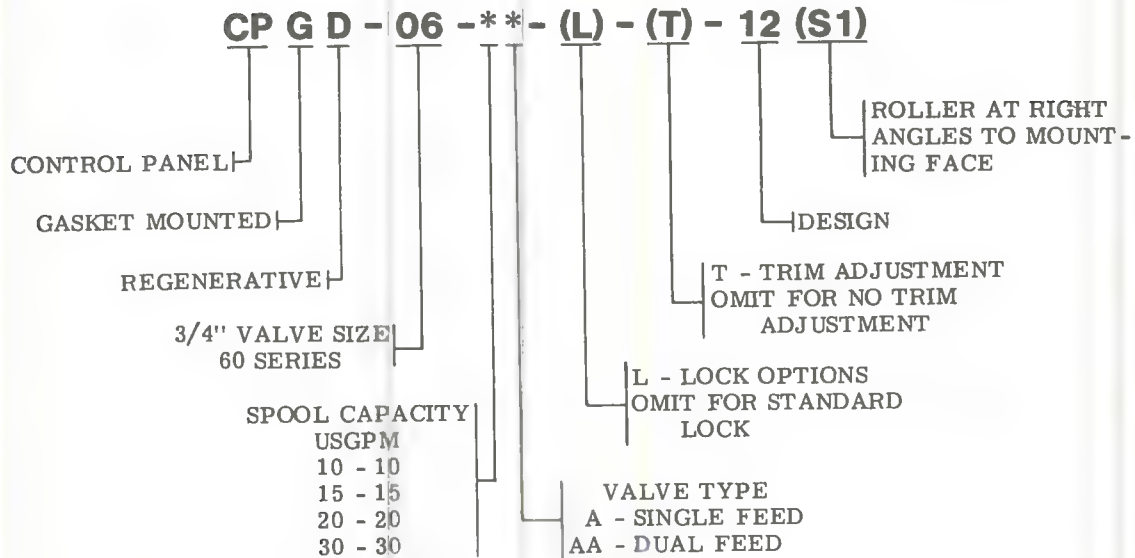
● 2 REQUIRED ON DUAL FEED PANELS CPGD-06-*AA-12.

▲ INCLUDED IN 919609 SEAL KIT



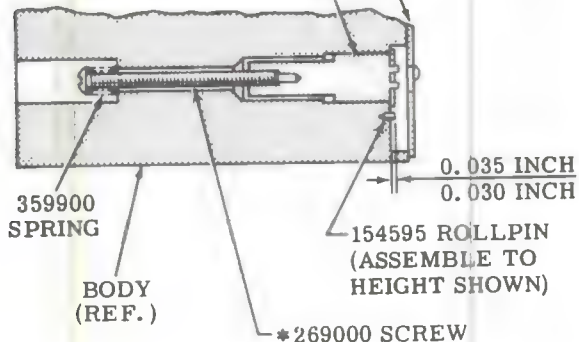


MODEL CODE BREAKDOWN



942292 LOCK OPTION KIT
(SINGLE FEED PANEL)
942293 LOCK OPTION KIT
(DUAL FEED PANEL)

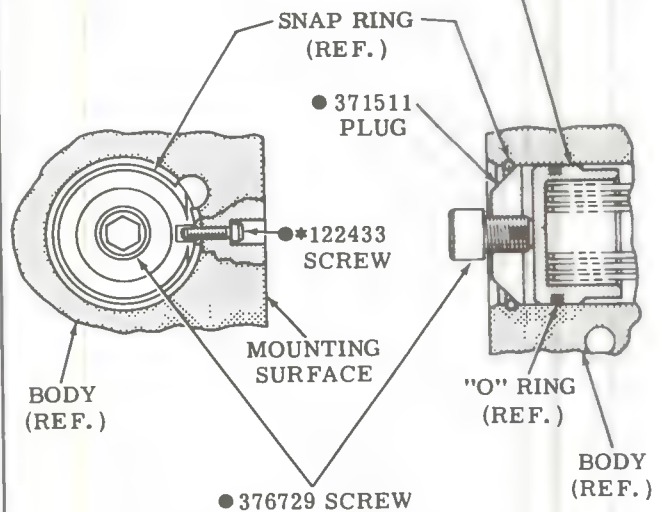
375733 SUBASSEMBLY



NOTE
COAT THREADS OF *SCREW WITH SEALANT
(LOCTITE GRADE "C" OR EQUIVALENT).
TIGHTEN TO LOCKING POSITION THEN BACK-OFF 1/4 TURN.

LOCK OPTION
MODELS CPGD-06-**-L-*-12

● 374121 SPRING RETAINER



● INCLUDED IN 942294 TRIM ADJ. KIT

NOTE
COAT THREADS OF *SCREW WITH SEALANT
(LOCTITE GRADE "C" OR EQUIVALENT).
TIGHTEN TO LOCKING POSITION.

TRIM ADJUSTMENT OPTION
MODELS CPGD-06-**-T-12

To insure sustained efficiency and maximum trouble free life of this precision equipment, initial and continuous full flow filtration of the fluid medium is essential. Select and apply filters from the Vickers OFP, OFR, and OFRS series, which are available in 3, 10, and 25 micrometre filtration ratings.

Litho in U. S. A.



Service Parts Information

Single & Dual
Feed Control
Panels

CPG-06-*A-*-*-12
CPG-06-*AA-*-*-12



Vickers, Incorporated

1401 Crooks Road
Troy, Michigan 48084

Revised 11-1-85 I-3608-S

CONVERSION OF A SINGLE FEED PANEL TO ADUAL FEED PANEL IS ACCOMPLISHED BY INSTALLING CONVERSION KIT 942245. THE KIT CONTAINS THE FOLLOWING PARTS:

PART NO.	NAME	QTY.
155091	BACK-UP RING	1
177537	SPRING	1
200978	SPRING	1
207638	PLUG	1
207772	SHAFT	1
207775	INDICATOR	1
207782	SET SCREW	1
224347	ROD	1
224352	THROTTLE (COARSE)	1
262330	"O" RING	1
349143	DIAL S/A	1
349458	PAWL	1
380232	COVER PLATE	1

WITH 207772 SHAFT TURNED IN, ADJUST 207638 POSITIONING PLUG IN DIAL SO THAT "O" ON DIAL LINES UP WITH POINTER ON COVER PLATE WHEN DIAL IS ASSEMBLED ON SHAFT. LOCK SECURELY WITH 207782 SET SCREW. INSERT 207775 RANGE INDICATOR SO THE LETTER "A" MAY BE SEEN AT RANGE OPENING IN COVER PLATE. REPEAT PROCEDURE-DUAL FEED PANEL.

*OPTIONAL SPACERS (PART NO. 211026) ARE AVAILABLE TO PROVIDE THE FOLLOWING MAXIMUM FLOW RATES:

NUMBER OF SPACERS	APPROXIMATE MAXIMUM CONTROLLED FLOW (CU.IN./MIN.)	
	FINE FEED	COARSE FEED
4	100	400
3	300	800
2	700	1200
1	1100	1400

■ THESE PARTS ARE USED ONLY ON THE SINGLE FEED PANEL CPG-06-*A-12. THEY MUST BE REMOVED IF THE PANEL IS BEING CONVERTED TO DUAL FEED TYPE.

COVER PLATE	MODEL
380234	CPG-06-A-12
380232	CPG-06-AA-12

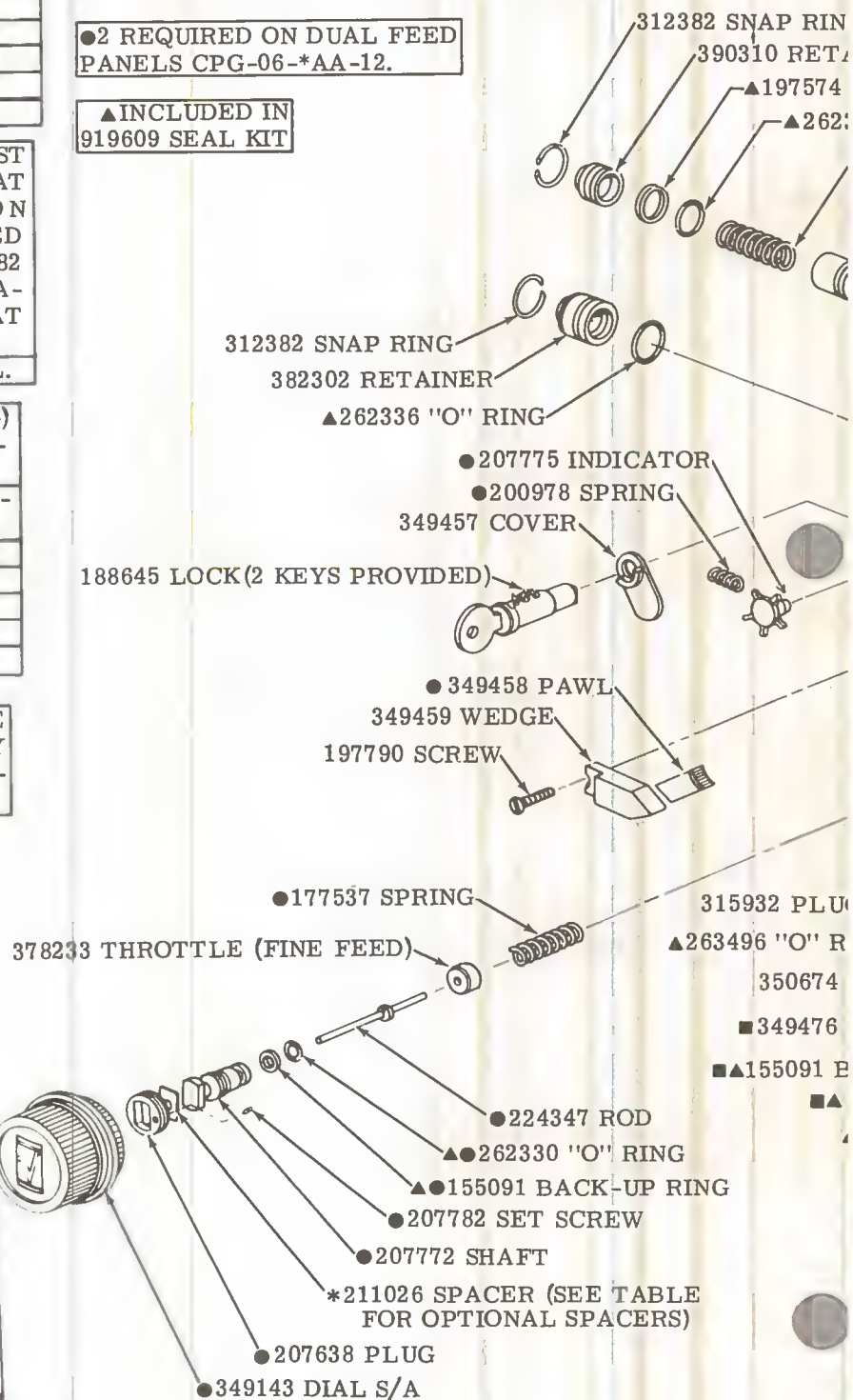
AX-36212 SCREW
(7 REQ'D)

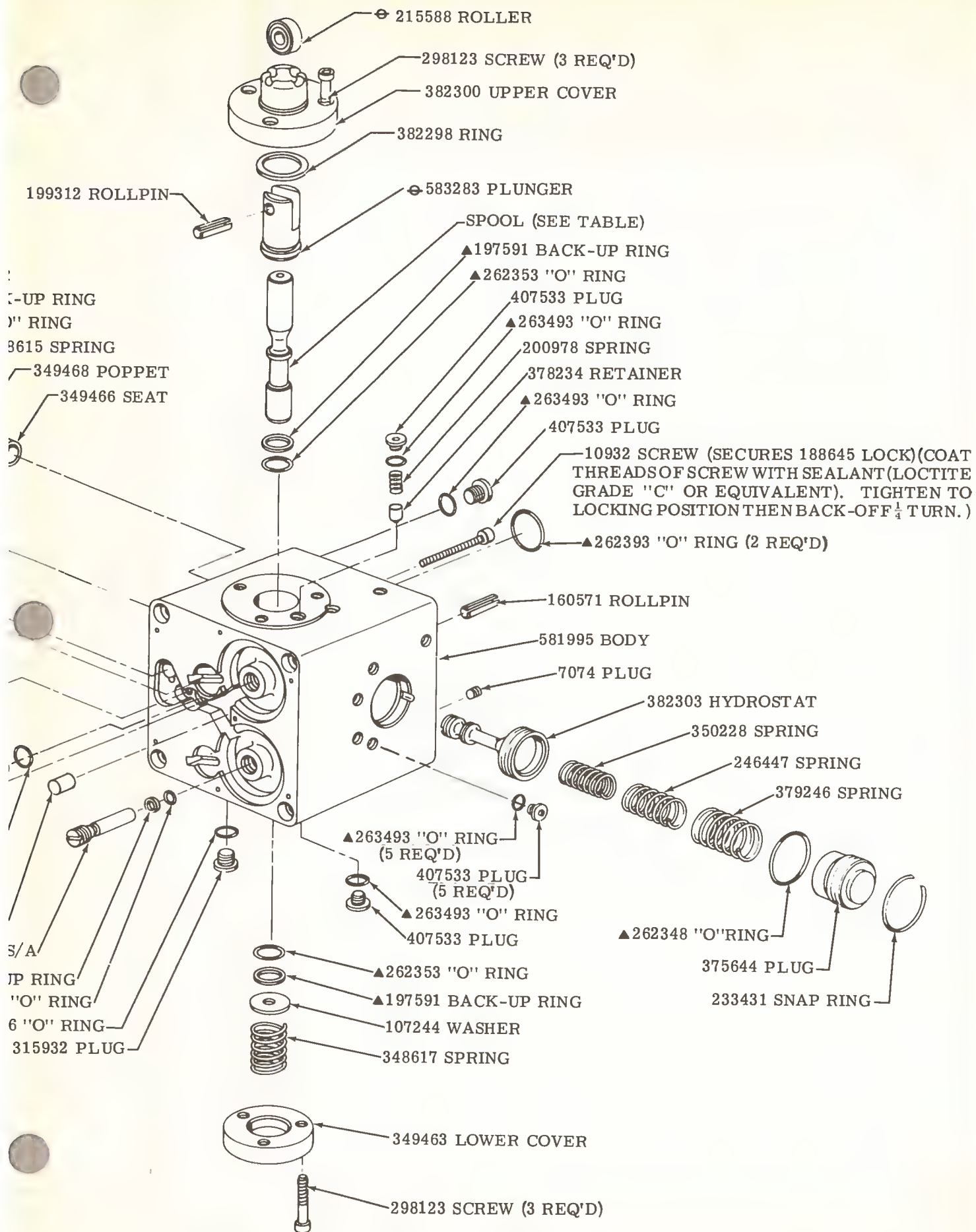
⊖ 215588 ROLLER AND 583283 PLUNGER CAN BE POSITIONED AT RIGHT ANGLES TO THE MOUNTING FACE. TAP OUT ROLLPIN, REMOVE ROLLER AND TURN PLUNGER CLOCKWISE (CW) 90°. INSTALL ROLLER AND PIN. (SEE MODEL CODE)

SPOOL	RATED FLOW USGPM	MODEL
352434	10	CPG-06-10A(A)-12
352435	15	CPG-06-15A(A)-12
352436	20	CPG-06-20A(A)-12
352450	30	CPG-06-30A(A)-12

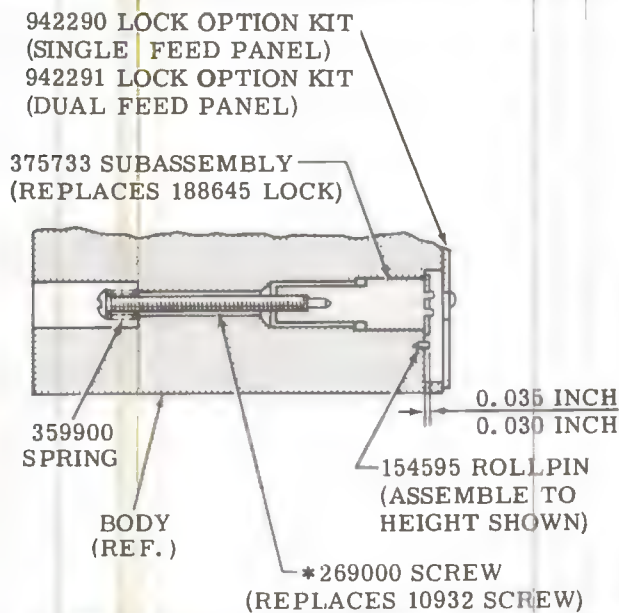
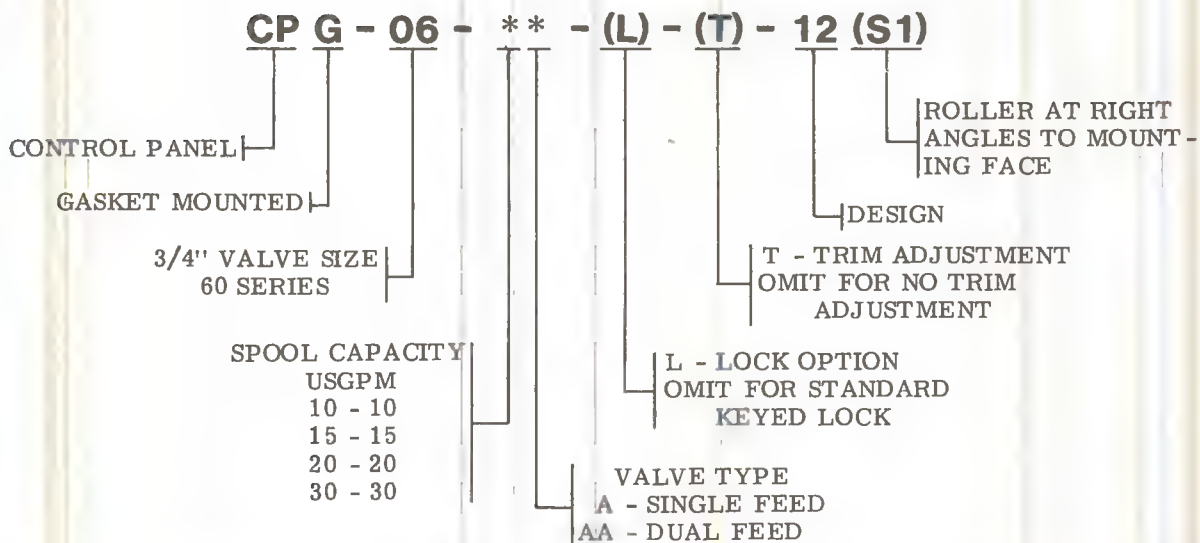
● 2 REQUIRED ON DUAL FEED PANELS CPG-06-*AA-12.

▲ INCLUDED IN 919609 SEAL KIT



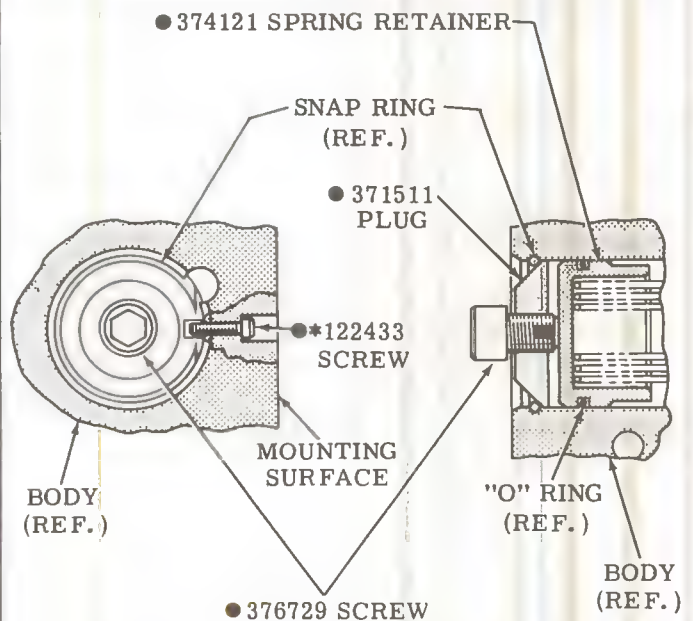


MODEL CODE BREAKDOWN



NOTE
COAT THREADS OF *SCREW WITH SEALANT (LOCTITE GRADE "C" OR EQUIVALENT). TIGHTEN TO LOCKING POSITION THEN BACK-OFF 1/4 TURN.

LOCK OPTION
MODELS CPG-06-**-L-*-12



● INCLUDED IN 942294 TRIM ADJ. KIT

NOTE
COAT THREADS OF *SCREW WITH SEALANT (LOCTITE GRADE "C" OR EQUIVALENT). TIGHTEN TO LOCKING POSITION.

TRIM ADJUSTMENT OPTION
MODELS CPG-06-**-T-12

To insure sustained efficiency and maximum trouble-free life of this precision equipment, initial and continuous filtration of the fluid medium to 25 microns absolute or less is essential. (For information pertaining to Vickers economical filters, see bulletin 81-216.)

Litho in U. S. A.

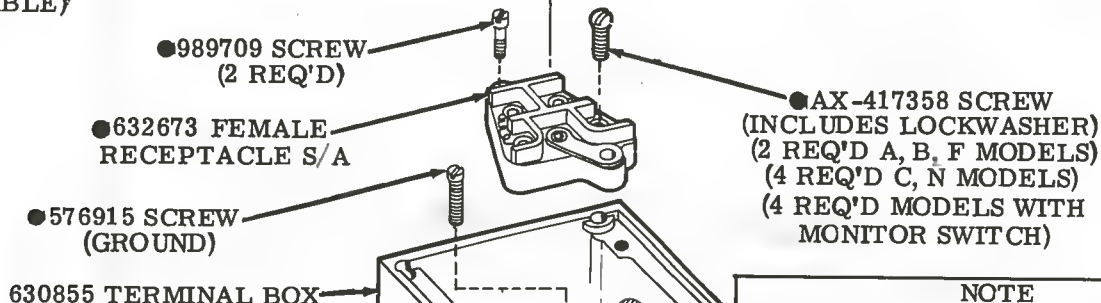
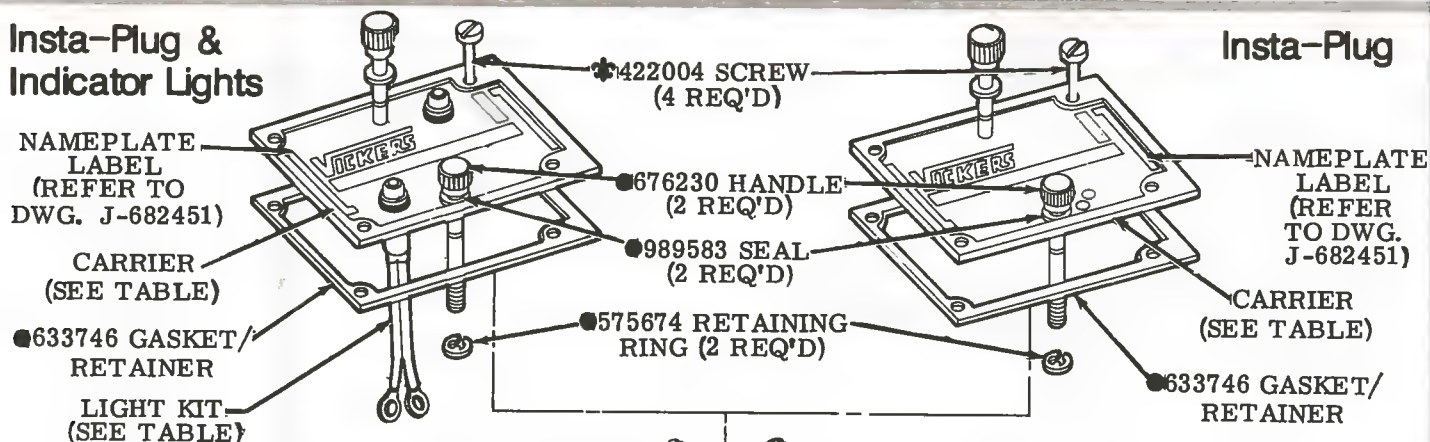
Service Parts Information

VICKERS
A TRIMONA COMPANY

ELECTRICAL FEATURES & OPTIONS

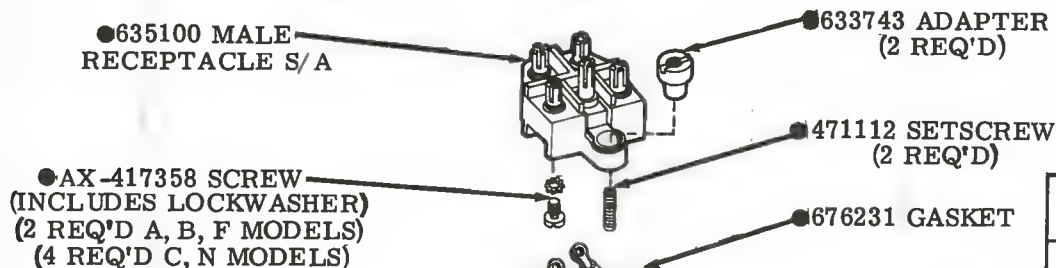
(KDG4V-3-*** (L)-M(S)(P**)-**-*-40

Insta-Plug & Indicator Lights



CARRIER	
633732	INSTA-PLUG WITH LIGHTS
635065	LIGHTS
635066	INSTA-PLUG

NOTE
INDICATOR LIGHT (WL), LOW WATTAGE COILS (B-9), & RESTRICTOR PLUG FEATURES NOT AVAILABLE ON K*G4V-3-40 MODELS. REFER TO I-3860-S FOR DETAILED MODEL CODE BREAKDOWN.



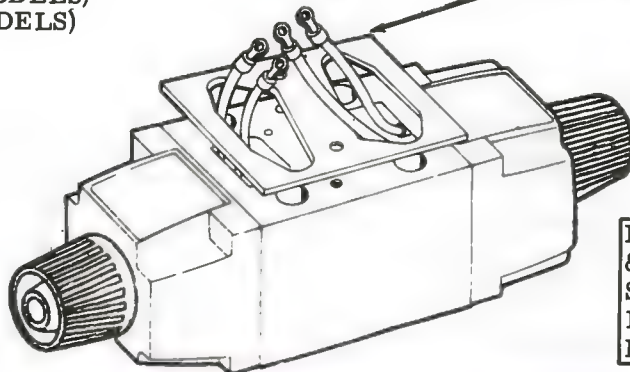
●INCLUDED IN 926455 INSTA-PLUG KIT

* LOT KITS (25 PCS. ONLY)	
PART NO.	KIT NO.
422004	944066

VOLTAGE RANGE	LIGHT KIT
12V AC/DC	926499
24V AC/DC	926431
115V AC/DC	926432
230V AC/DC	926458
LIGHT KITS INCLUDE TWO LIGHTS	

PARTS PREFIXED WITH SYMBOL AVAILABLE ONLY IN KIT

INSTA-PLUG PART NUMBERS & ASSEMBLY / DISASSEMBLY SEQUENCE ARE THE SAME FOR SINGLE & DOUBLE SOLENOID MODELS.



Vickers, Incorporated
P.O. Box 302
Troy, Michigan 48007-0302

Revised 3-1-87

I-3866-S

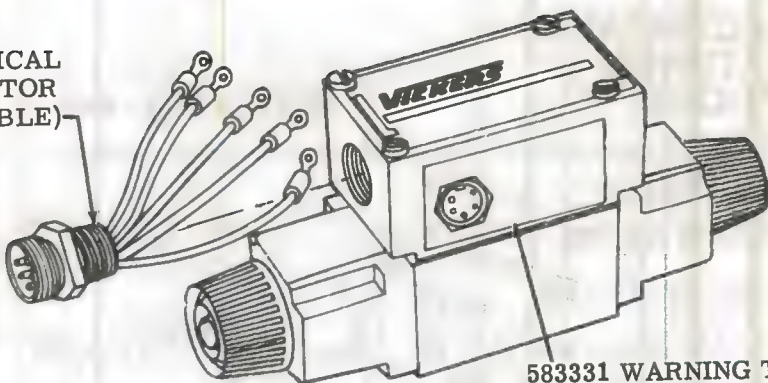
Electrical Connector
& Wiring Diagram

CONNECTOR TYPE	PART NUMBER	WARNING TAG
3 PIN	400784	400881
5 PIN	409706	400882

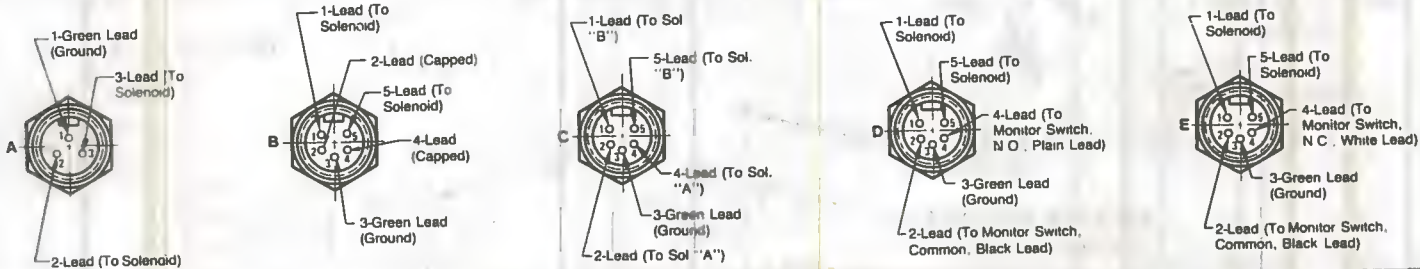
ELECTRICAL POWER MUST BE DISCONNECTED BEFORE REMOVING OR REPLACING ELECTRICAL PLUG

- A — 3 Pole Single Solenoid Models
B — 5 Pole Single Solenoid Models
C — 5 Pole Double Solenoid Models
D — 5 Pole Single Solenoid & Monitor Switch Models (Wired Normally Open)
E — 5 Pole Single Solenoid & Monitor Switch Models (Wired Normally Closed)

ELECTRICAL CONNECTOR
(SEE TABLE)



583331 WARNING TAG
(MONITOR SWITCH)
(SEE TABLE FOR ALL OTHER MODELS)



MODEL CODE BREAKDOWN

(K)DG4V-3-***(L)-M(S)(P**)-**-*(9)-(***)-40

PROPORTIONAL VALVE

DIRECTIONAL VALVE

SUBPLATE OR MANIFOLD MOUNTED

SOLENOID OPERATED

MAXIMUM PRESSURE RATING 350 bar (5000 PSI)

INTERFACE NFPA/D01/ISO-4401-3

SPOOL TYPE

SPOOL SPRING ARRANGEMENT

MANUAL OVERRIDE (OMIT WHEN NOT REQ'D)

LEFT HAND (OMIT WHEN NOT REQ'D)

FLAG SYMBOL HEADING ELECTRICAL FEATURES AND OPTIONS

DESIGN

RESTRICTOR PLUG (OMIT WHEN NOT REQUIRED)

LOW WATTAGE COIL (B COIL ONLY)

COIL CODE LETTER

ELECTRICAL OPTIONS

- U - DIN 43650 COIL
- W - WIRING HSG. 1/2 NPT. THD.
- WL - WIRING HSG. 1/2 NPT. THD. (WITH INDICATOR LIGHTS)

ELECTRICAL FEATURES

- PA3 - 3 PIN RECEPTACLE (SINGLE SOLENOID ONLY)
- PA5 - 5 PIN RECEPTACLE
- PB - INSTA-PLUG MALE & FEMALE RECEPTACLE

MONITOR SWITCH

NOTE - REFER TO SPECIFIC PARTS DWG. FOR MORE DETAILED MODEL CODE BREAKDOWN.

Service Parts Information

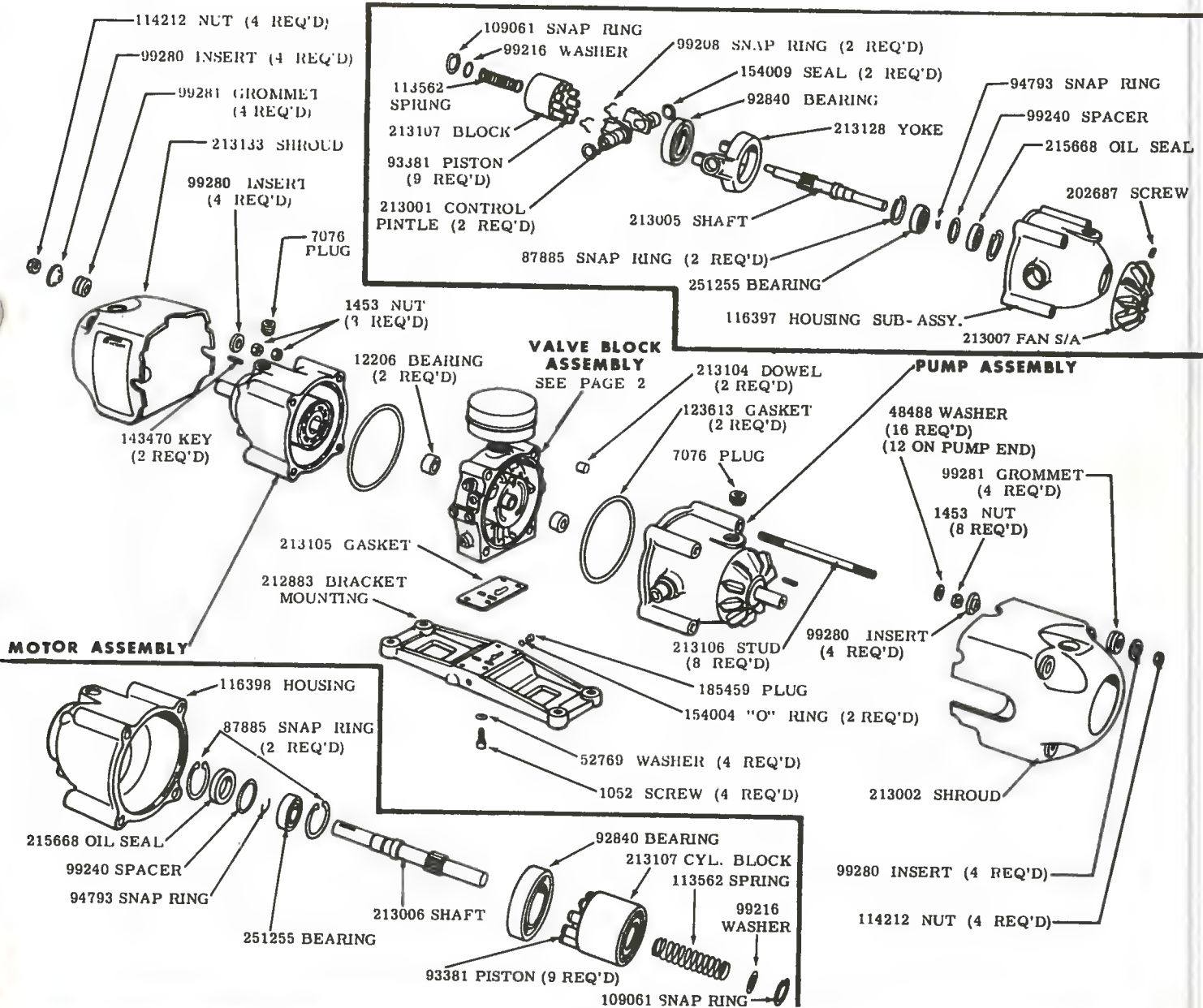
**ADJUSTABLE
SPEED
DRIVES**

TR3- ** 13F13-20



TR3- ** 13F13-20

TYPE PRESSURE CONTROL FOR PUMP END
CONTROL LOCATION FOR RIGHT OR LEFT SIDE
13 32" DIAMETER CYLINDER BORES
2ND DESIGN NO MODIFICATION
13 32" DIAMETER CYLINDER BORES
TYPE CONTROL FOR MOTOR END



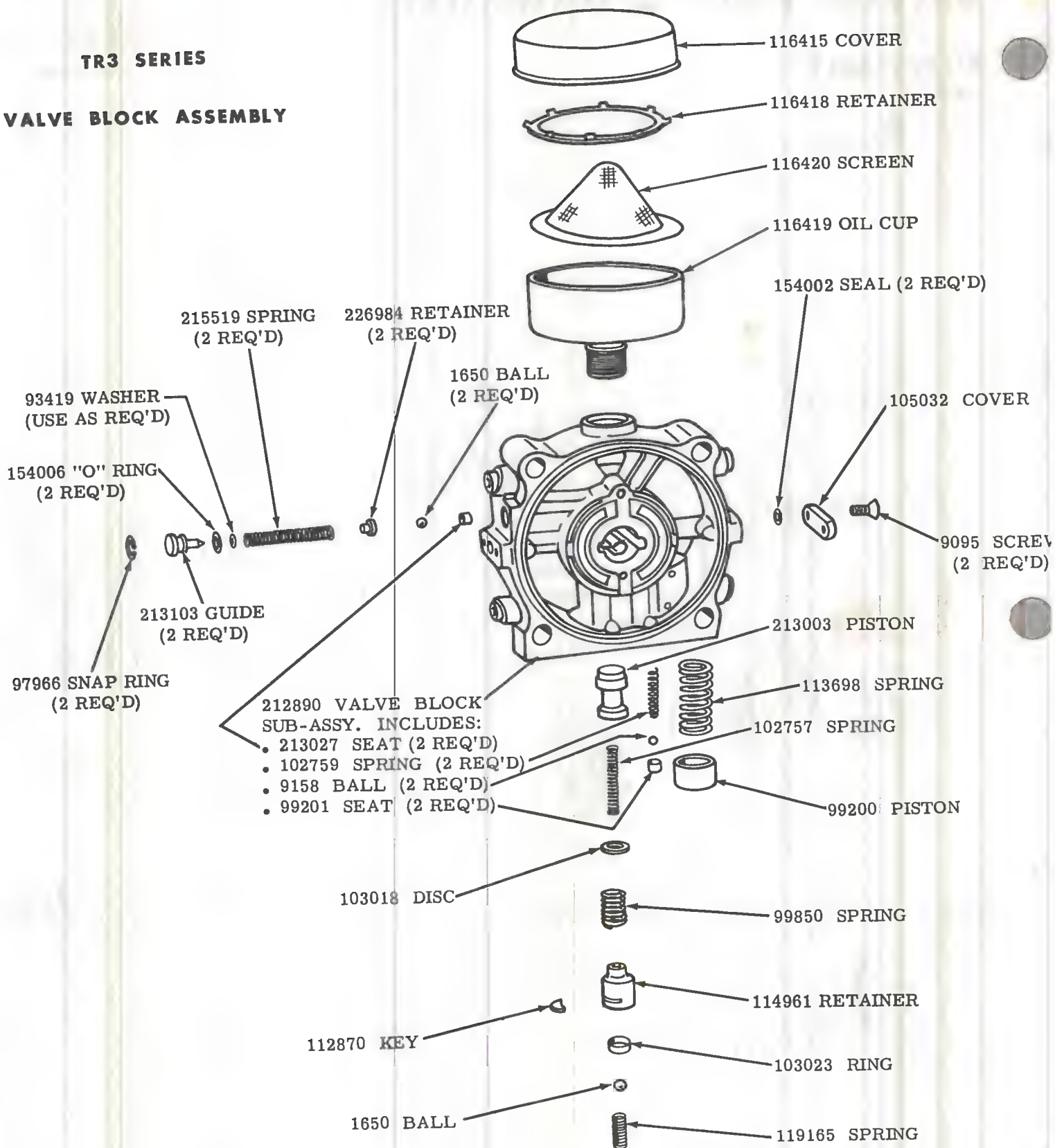
Vickers, Incorporated
1401 Crooks Road
Troy, Michigan 48084

Revised 11-1-87

I-3815-S

TR3 SERIES

VALVE BLOCK ASSEMBLY



For satisfactory service life of these components, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from Vickers OFP, OFR, and OFRS series are recommended.

Litho in U. S. A.

Service Parts Information

**Bladder
Type
Accumulators**

(F3) A1-75-30
(F3) A1-200-30
(F3) A1-550-30
(F3) A1-1050-30
(F3) A1-2050-30



Vickers, Incorporated

1401 Crooks Road
Troy, Michigan 48064

Revised 8-1-88

I-3986-S

TABLE OF CONTENTS

SECTION

PAGE

I

INTRODUCTION

A. Purpose of Manual

B. Related Publications

C. Model Code

1

1

1

II

DESCRIPTION

A. General Description

B. Operation

1

1

III

INSTALLATION & MAINTENANCE

A. Installation

B. Placing Accumulator in Service

C. Product Life

2

2

2

IV

PRECHARGING PROCEDURE

2

V

OVERHAUL

A. Service Tools

B. Troubleshooting Guide

C. Disassembly

D. Cleaning

E. Inspection, Repair & Part Replacement

F. Assembly

3

4

4

6

6

6

SECTION I - INTRODUCTION

A. PURPOSE OF MANUAL

This manual provides operating instructions and overhaul information for Vickers -30 design bladder type accumulators. Information contained herein pertains to the latest design series as listed in Table 1.

Model	Assembly No.
A1-75-30	633100
A1-200-30	633101
A1-550-30	633102
A1-1050-30	633103
A1-2050-30	633104

Table 1. Model Series

B. RELATED PUBLICATIONS

Service part information is included in this manual. Installation and performance specifications are not covered in this manual. Overall dimensions and performance data are shown on installation drawing 521801. The installation drawing is available from any Vickers sales engineering office or from:

Vickers, Incorporated
Technical Publications
1401 Crooks Road
Troy, Michigan 48084

C. MODEL CODE

Variations within each model series are described in the model code. The model code is stamped on the accumulator nameplate. See Table 2.

F3	A1 -	*****	-30
Seals for Mineral Oil and Fire Resistant Fluids	Accumulator Bladder Type	Nominal Size (Gas Capacity - in. ³)	(Fluid Capacity - Gal.) Design
		75	61 1/4
		200	213.6 1
		550	579.7 2.5
		1050	1067.9 5
		2050	2044.2 10

Table 2. Model Code

Section II - DESCRIPTION

A. GENERAL DESCRIPTION

Vickers industrial type accumulators are made of seamless steel alloy that is shaped into a cylindrical form having spherical ends. Each accumulator contains a Buna type rubber bladder. The bladder is precharged through the valve core with nitrogen gas. The opposite end of the accumulator contains an oil valve which connects into the hydraulic circuit. The oil valve has an SAE straight thread connection. The bladder is protected from wear at the oil valve end by a rubber sealing ring. This sealing ring helps prevent scuffing of the bladder during operation. The shell interior has a 500 micro finish that increases bladder life. Figure 1 is a

typical cross sectional view of a -30 design bladder type accumulator.

B. OPERATION

Operation of the accumulator is automatic. A combination of oil, which is virtually non-compressible, and nitrogen, which can both expand and compress, make the accumulator work. As oil is pumped into the accumulator, it forces the gas to compress until resistance of the gas equals the oil pressure. When the hydraulic system needs oil, the compressed gas forces oil from the accumulator to maintain system flow.

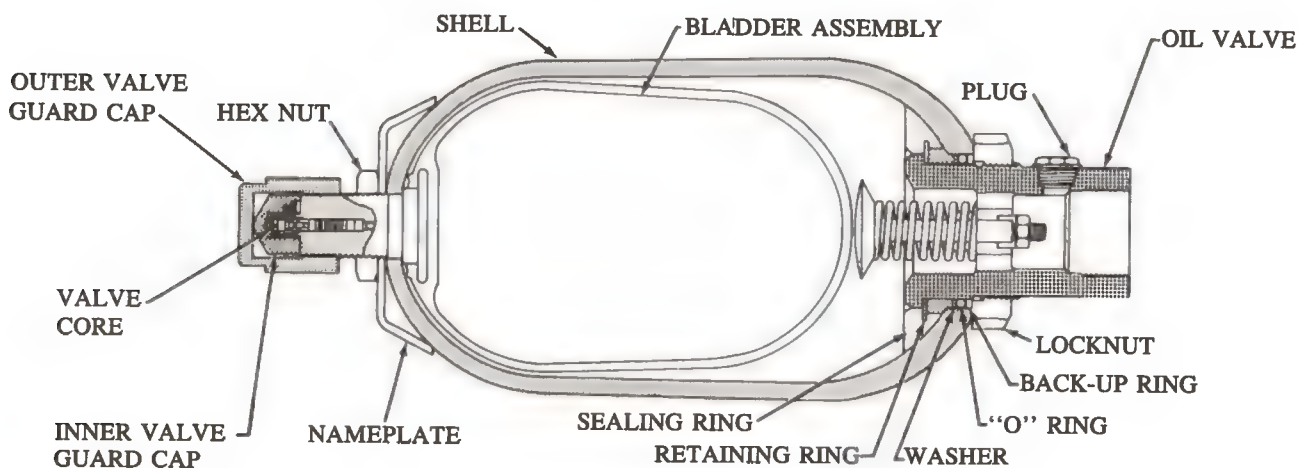


Figure 1. Sectional View

Section III - INSTALLATION & MAINTENANCE

A. INSTALLATION

All Vickers accumulators have female connections. If it is necessary to adapt to smaller fittings, forged steel reducer bushings should be used. Vertical mounting of the accumulator is recommended, but horizontal mounting is permissible. A1-75-30 and A1-200-30 accumulators may be mounted in a line unsupported, providing the line can support the charged accumulator and is free from excessive vibration. Supports should be provided whenever possible. Large size accumulators *must* be supported.

NOTE

Before an accumulator is installed in a hydraulic circuit, it should be inspected, supplied with lubrication oil, and pre-charged with nitrogen gas. Refer to Section IV for the accumulator precharge procedure.

CAUTION

NEVER USE OXYGEN GAS IN AN ACCUMULATOR.

NOTE

When the accumulator is installed in a hydraulic circuit, make sure the accumulator lock nuts and the bleeder plug are tight.

B. PLACING ACCUMULATOR IN SERVICE

After a hydraulic circuit has been opened by alterations to the circuit, the circuit should be purged of air. This is accomplished by purging the circuit at its highest point while intermittently operating its components. If purging is desired in the area of the accumulator, it may be accomplished through the optional bleeder plug located on the side of the oil valve. A 1/4 NPTF plug is standard.

CAUTION

DO NOT REMOVE THE BLEEDER PLUG (4) FROM THE ACCUMULATOR. Caution must be used when loosening the bleeder plug, as the oil is under high pressure. Use the bleeder plug to remove extrained air from the accumulator portion of the circuit.

C. PRODUCT LIFE

The service life of this product is dependent upon environment, duty cycle, operating parameters and system cleanliness. Since these parameters vary from application to application, the user must determine and establish the periodic maintenance required to maximize life and detect potential component failure.

Section IV - PRECHARGING PROCEDURE

Precharge the accumulator with nitrogen gas as follows:

1. Remove the outer and inner valve guard cap from the gas valve.
2. Attach a charging hose assembly directly from the nitrogen bottle to the accumulator. Turn the 'T' bar handle inward to depress the valve core of the bladder. See Figure 2 for charging hose connections. Refer to Table 3 for the appropriate accumulator charging and gauge assemblies.

Model	Ass'y.	Nomenclature
ACGH-0-L-10	579309	No gauge - L.H. female thd.
ACGH-1500-L-10	179442	1500 PSI liquid filled gauge, L.H. female thd.
ACGH-3000-L-10	179443	3000 PSI liquid filled gauge, L.H. female thd.
ACGH-0-R-10	579310	No gauge - R.H. male thd.
ACGH-1500-R-10	579311	1500 PSI liquid filled gauge, R.H. male thd.
ACGH-3000-R-10	579312	3000 PSI liquid filled gauge, R.H. male thd.

Table 3. Accumulator Charging & Gauging Assemblies

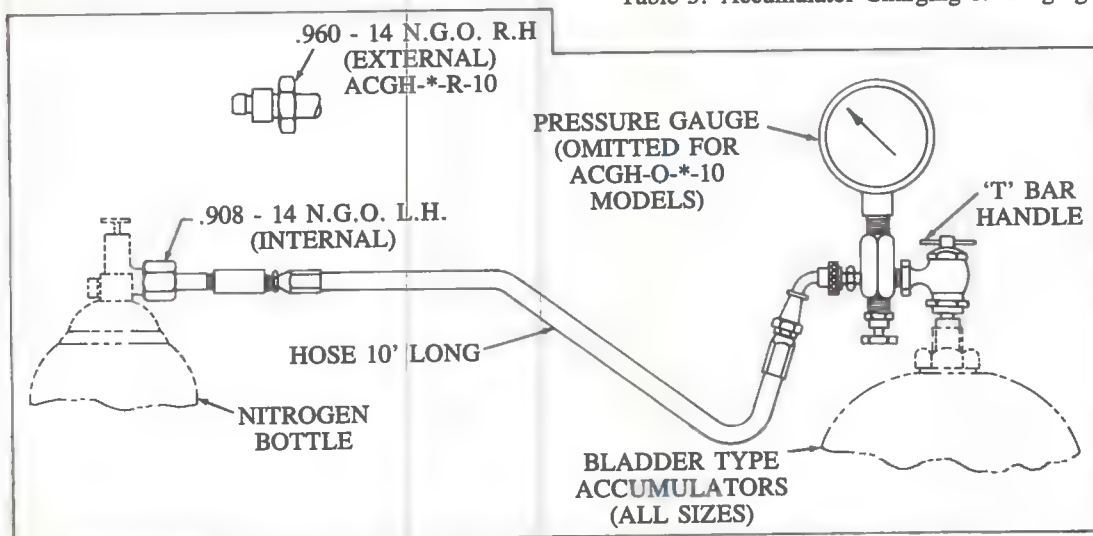


Figure 2. Accumulator Charging & Gauging Device.

3. Open the valve on the nitrogen bottle slowly allowing nitrogen to flow to the accumulator. Intermittently close the valve to allow the accumulator gauge to settle. Precharge pressure will vary with each application, but must not be less than one quarter ($\frac{1}{4}$) or preferably one third ($\frac{1}{3}$) of the maximum working pressure.

If an accumulator is to be used for absorbing pump pulsations or line shocks, it should be precharged to 60 percent of the mean line pressure and installed as near the source of shock as possible.

4. When the required pressure is reached, maintain for two minutes then read the gauge again. As the nitrogen equalizes in the accumulator, a slight pressure drop will be observed. Slowly open the charging valve again and bring pressure up to the desired reading.

5. Close valve on the nitrogen bottle securely. Turn the "T" bar handle at the accumulator outward to release the valve core, then remove the charging hose assembly.

6. Carefully test accumulator gas connection for leakage

by pouring system fluid in and around the valve core area. Tighten any loose connections. If the core leaks, depress and release the core rapidly to reseal the valve core. No leakage can be tolerated in this area. Replace the core if leakage cannot be stopped.

7. Install a shut-off valve between the accumulator oil port and the main line. Action of the accumulator on the hydraulic circuit can be stopped by means of this valve. Another shut-off valve should be installed between the accumulator and the reservoir. These valves provide a means of isolating and draining the accumulator in the event that servicing is required.

8. Install the accumulator in an accessible location for ease of maintenance.

9. Install a check valve between the pump and accumulator to prevent pump reversal. Other valves may be installed between the check valve and the pump for unloading after maximum circuit pressure is attained.

10. **DO NOT** weld supports to the accumulator shell.

Section V – OVERHAUL

A. SERVICE TOOLS

The following list of service tools are required to overhaul a Vickers bladder type accumulator. Special service tools are shown in Figure 3.

1. 10" adjustable wrench
2. A small, thin blade screwdriver
3. A medium size screwdriver
4. Compressed air
5. Cleaning solvent (methylated spirits or water)
6. Soap solution with brush applicator

7. Heavy duty vise with padded jaws (use on smaller accumulators)
8. Chain vise (use on larger accumulators)
9. A clean, sturdy work bench
10. Spanner wrench (see Figure 3)
11. Valve core tool (see Figure 3)
12. Clean, system fluid
13. Safety glasses
14. A medium size funnel
15. Nitrogen gas
16. Accumulator charging devise (see Figure 2 and Table 3)
17. Flashlight

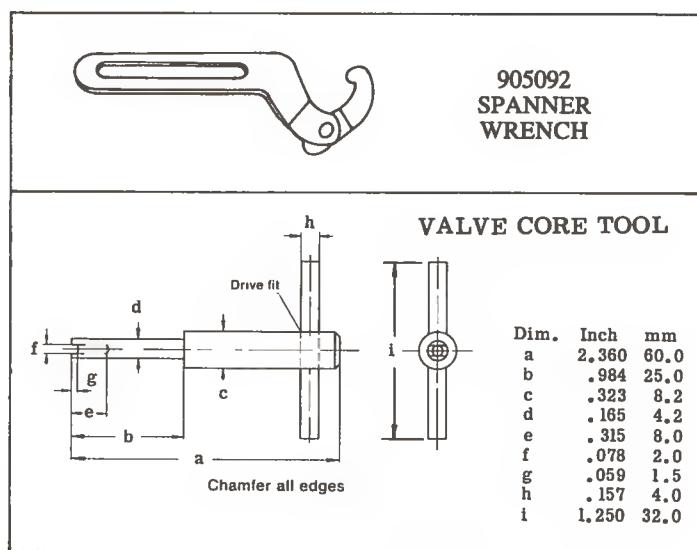


Figure 3. Special Service Tools

B. TROUBLESHOOTING GUIDE

CAUTION

Make sure the accumulator is not subject to hydraulic pressure before removing it from the circuit.

The following chart (Table 4) provides types of accumulator problems, probable causes, and repair solutions. In most cases, accumulator overhaul requires the replacement of the bladder and anti-extrusion ring assembly. Note that improper operating conditions may cause accumulator failure. If this is the case, make sure that the operating conditions are corrected before placing the accumulator into service.

TYPE OF PROBLEM	PROBABLE CAUSE	REPAIR SOLUTION
External Leakage:		
1. Gas valve leaks.	Damaged or broken gas valve core.	Replace valve core or bladder.
2. Gas valve leaks.	Loose connection at accumulator gas valve.	Tighten connection.
3. Oil valve leaks.	Damaged or missing seals.	Replace with new anti-extrusion ring kit.
4. Oil valve leaks.	Loose connection, damaged threads, improper oil valve function.	Tighten connection or replace oil valve.
Internal Leakage:		
1. Bladder leaks at vulcanized seam.	Foreign material introduced into bladder Manufacturing or material fault.	Replace bladder. Check system for cleanliness.
2. Bladder is charred, brittle, or porous.	Working pressure ratio too high causing excessive nitrogen and oil temperature.	Replace bladder. Check working pressure parameters.
3. Cracks at center portion of bladder.	Material fatigue.	Replace bladder.
4. Hole in bladder.	Damaged at assembly, or charge pressure too low causing hole in bladder.	Replace bladder. Check accumulator charge pressure.

Table 4. Troubleshooting Guide

C. DISASSEMBLY

Disassemble the accumulator by item sequence number as shown in Figure 4. Place accumulator parts on a clean surface for inspection.

CAUTION

WEAR SAFETY GLASSES TO PREVENT POSSIBLE EYE INJURY.

1. For smaller size accumulators, clamp the oil valve (10) portion of the accumulator in a heavy duty vise. Protect the oil valve by inserting two flat pieces of steel between the oil valve and the vise jaws. For larger size accumulators, secure the accumulator in a chain vise.

2. Remove outer and inner valve guard cap (1 & 2) to expose core (3).

3. Press on valve core (3) to release gas from the accumulator bladder.

4. Remove valve core (3) with the valve core tool shown in Figure 3.

5. Loosen hex nut (11).

6. Remove slotted nut (4) with a spanner wrench.

7. Remove accumulator from vise and secure on a clean, sturdy work bench.

8. Remove and discard back-up ring (5), o-ring (6), and washer (7) from oil valve (10). Use a thin bladed screwdriver.

9. Push oil valve (10) into accumulator shell (14) until retaining ring (8) and sealing ring (9) are exposed.

10. Reach into shell and align the two flat surfaces of retaining ring (8) with shell opening. Remove retaining ring from shell.

11. Reach into shell and remove sealing ring (9) from shell. Bend or compress the sealing ring to facilitate removal.

12. Remove oil valve (10) from shell (14).

13. Remove hex nut (11) and nameplate (12).

14. Reach into shell opening and remove bladder (13). Slightly fold and twist the bladder for easier removal. If the bladder is very slippery, hold onto bladder with a clean rag.

Item No.	Part Name	Part Numbers				
		Model A1-75-30 (1 Quart)	Model A1-200-30 (1 Gallon)	Model A1-550-30 (2.5 Gallon)	Model A1-1050-30 (5 Gallon)	Model A1-2050-30 (10 Gallon)
1	Outer Valve Guard Cap ☺ ●	682428	682428	682428	682428	682428
2	Inner Valve Guard Cap ☺ ●	682427	682427	682427	682427	682427
3	Valve Core ●	682450	682450	682450	682450	682450
11	Hex Nut ●	682426	682426	682426	682426	682426
12	Nameplate	682415	633106	633107	633107	633107
13	Bladder Assembly STD. ● F3	926380 926573	926381 926574	926382 926575	926383 926576	926384 926577
14	Shell (Not for sale)	—	—	—	—	—
4	Slotted Nut ○	○(STD.) 926385 (F3) 926578	○(STD.) 926386 (F3) 926579	○(STD.) 926387 (F3) 926580	○(STD.) 926387 (F3) 926580	○(STD.) 926387 (F3) 926580
5	Backup Ring ○					
6	“O” Ring ■ ○					
7	Washer ○					
8	Retaining Ring ○					
9	Sealing Ring ○					
10	Oil Valve Kit STD. ■ F3	926496 926581	926497 926582	926498 926583	926498 926583	926498 926583

- Included in STD. bladder assembly.
F3 equivalent bladder assembly.
- ☺ Included in valve guard cap kit 926532
- Included in STD. anti-extrusion ring kit.
F3 equivalent anti-extrusion ring kit.
- Included in STD. oil valve kit.
F3 equivalent oil valve kit.

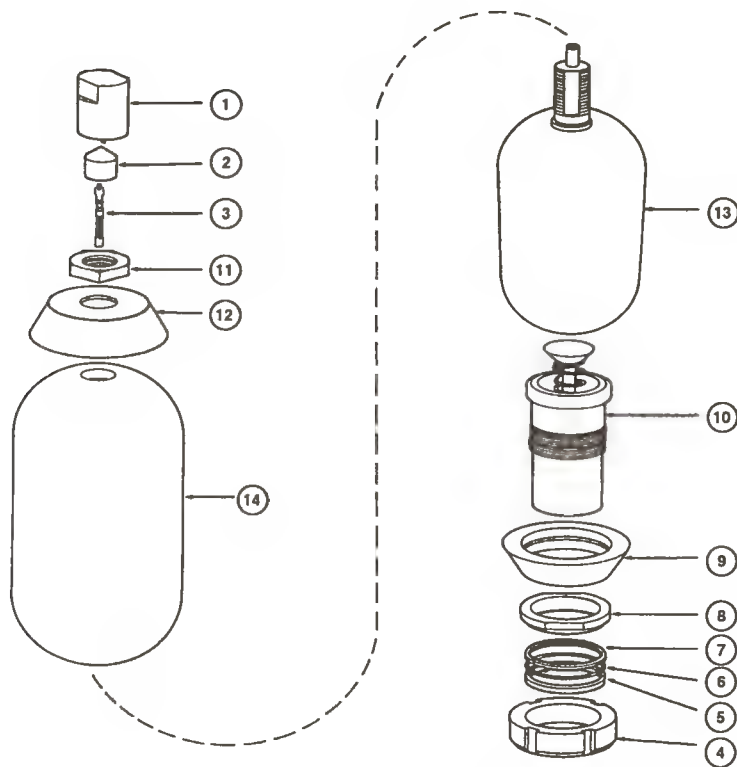


Figure 4. Exploded View

D. CLEANING

Wash all parts, except bladder (13), sealing ring (9), and o-ring (7) with trichloroethylene or a suitable cold cleansing agent. Wash bladder (13) with methylated spirits or water. Dry off parts for inspection.

E. INSPECTION, REPAIR & PART REPLACEMENT

1. Discard rubber seals and obtain a new anti-extrusion ring kit. Refer to Figure 4 for the kit part number.

2. Visually inspect accumulator bladder (13) for holes, cracks, charring, and distortion. Replace the bladder if any of the preceding conditions are evident. If the bladder seems to be in good condition, perform step 3.

3. Check the bladder for leaks as follows:

a. Screw valve core (3) into bladder.

b. Inflate the bladder with filtered compressed air to 1.4 times its size.

c. Apply a soap solution to the entire bladder surface, including the valve core area. Carefully check the bladder surface and valve core area for leaks. **NO LEAKS ARE ALLOWED.** Replace the bladder if a leak is detected.

4. Inspect oil valve (10) for damaged threads, burrs, and rust spots. Remove minor burrs with an India stone. Check the plunger and spring within the oil valve for proper function. Replace the oil valve if damaged threads, rust spots, or improper plunger/spring action are noted.

5. Inspect both shell (14) openings for burrs. Remove minor burrs with an India stone. Use a flashlight to inspect inside of shell. Check for cracks, scratches, or burrs. If condition of shell is questionable, replace the accumulator.

6. Inspect all other parts for wear and/or damage. Replace any part that looks worn or damaged.

F. ASSEMBLY

Assemble the accumulator in reverse item number sequence as shown in Figure 4. Perform the following steps:

1. Attach the valve core tool to the gas valve portion of bladder (13).

2. Wet inside of shell (14) and outer surface of bladder (13) with clean, system fluid.

3. Fold bladder (13) lengthwise and carefully insert it into oil valve opening of shell. Reach into gas valve opening of shell and grip the valve tool with pliers. Pull on the valve core tool until the gas valve portion of bladder protrudes out of gas valve opening of shell.

4. Insert nameplate (12) over the gas valve and onto shell.

5. Apply a small amount of oil to threads of hex nut (11). Screw hex nut (11) onto gas valve portion of bladder, hand tight. Remove the plug rod.

6. Reach into shell and press on the bladder to remove air from inside of bladder. Thread inner valve guard cap (2) onto gas valve portion of bladder while pressing on bladder. This will prevent the bladder from expanding during installation of anti-extrusion assembly (items 10 thru 5).

7. Dip the shoulder end of oil valve (10) and the sealing ring (9) into clean, system fluid. Hold onto threaded portion of oil valve and position the shoulder end of oil valve into shell opening. Next, fold sealing ring (9) and insert it into shell opening behind the oil valve. Push on the oil valve until the sealing ring fits uniformly around the shoulder end of oil valve.

8. Insert retaining ring (8) into shell opening and onto oil valve (10). Center the retaining ring against the sealing ring. Pull the oil valve outwards through the shell opening.

9. Remove inner valve guard cap (2). Install valve core (3) into gas valve portion of bladder with the valve core tool.

10. Fill bladder (13) with compressed air while centering the oil valve and retaining ring at opposite end of accumulator shell.

11. Wrap masking tape around threaded portion of oil valve (10).

12. Install washer (7), o-ring (6), and back-up ring (5) onto oil valve. Push the o-ring and back-up ring uniformly into shell with a blunt screwdriver. Remove the masking tape and apply a small amount of oil to the oil valve threads.

13. Screw slotted nut (4) onto oil valve (10). Tighten the nut securely with a spanner wrench. (Note: Make sure the oil valve does not turn while tightening the slotted nut. Secure the oil valve with a vise or large wrench.)

14. Apply a small amount of oil to pipe (bleeder) plug (4) threads. Screw the plug into oil valve (10).

15. Push on valve core (3) to release air from bladder (13). Remove the valve core to insure all the air is released from bladder. Reinstall the valve core.

16. Install inner valve guard cap (2) over the valve core.

17. Pour a liberal amount of system fluid (approximately 1/10th accumulator content) into oil valve port. Use a funnel for this operation. This step insures the proper lubrication of the bladder and inner shell surface. Roll the accumulator back and forth two or three times. Drain off the fluid. Remove inner valve guard cap (2).

18. Pre-charge the accumulator with nitrogen to approximately 10 PSI. Follow accumulator pre-charge instruction in Section IV. Tighten hex nut (11). Continue to pre-charge the accumulator until the correct pressure for your application is obtained.

19. Apply a soap solution to the valve core area of the accumulator. Check for leaks. **NO LEAKS ARE ALLOWED.** If the accumulator does not accept a pre-charge, refer to the troubleshooting chart (Table 4) for possible repair solutions.

20. Install inner valve guard cap (2) and outer valve guard cap (1).

21. When the accumulator is placed into service, refer to Section III—Installation & Maintenance and the installation drawing for proper instructions.

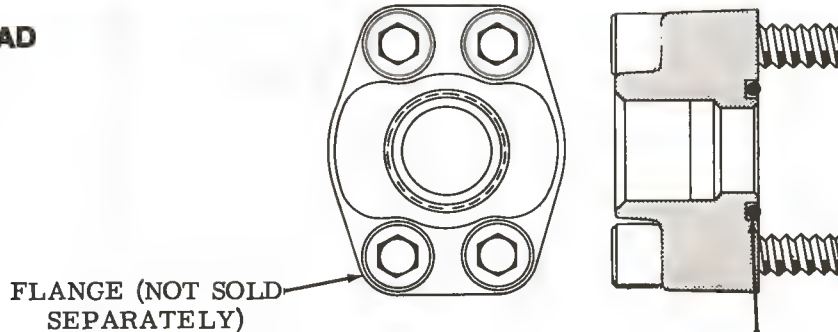
22. Check the pre-charge pressure within a week of initial pre-charge. The pressure should be checked with zero hydraulic pressure on the circuit. Disconnect the accumulator from the circuit by turning off the line valve and opening the valve to the reservoir.

Service Parts Information

VICKERS
A TRIMMOVA COMPANY

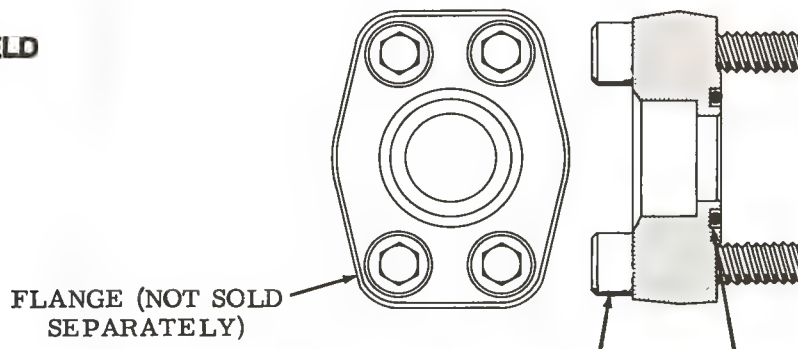
SAE SOLID 4-BOLT FLANGES

PIPE THREAD



MODEL NUMBER	PIPE SIZE	SCREW (4 REQ'D)	"O" RING	MAX. PSI PRESSURE
FL1-6-06P-10	3/4	1074	200139	3000
FL1-8-08P-10	1	1075	200143	
FL1-10-10P-10	1-1/4	298150	200145	
FL1-12-12P-10	1-1/2	1116	151296	
FL1-16-16P-10	2		200149	
FL1-20-20P-10	2-1/2	1117	200152	
FL1-24-24P-10	3	298169	200157	500
Ø FL1-24-24P-LP-10		298168		

SOCKET WELD



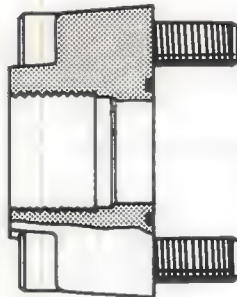
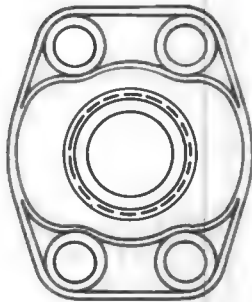
ORDER THE FLANGES BY COMPLETE MODEL NUMBER. SEALS AND SCREWS ARE INCLUDED.

Ø USED ON 45V SERIES INLET ONLY

MODEL NUMBER	PIPE SIZE	SCREW (4 REQ'D)	"O" RING	MAX. PSI PRESSURE
FL1-8-08W-10	1	1075	200143	3000
FL1-10-10W-10	1-1/4	298151	200145	
FL1-12-12W-10	1-1/2	10955	151296	
FL1-16-16W-10	2	1117	200149	
FL1-20-20W-10	2-1/2	298159	200152	
FL1-24-24W-10	3	298171	200157	
Ø FL1-24-24W-LP-10		298170		
FL1-28-28W-10	3-1/2	298168	200161	500
FL1-32-32W-10	4	298169	200165	

STRAIGHT THREAD

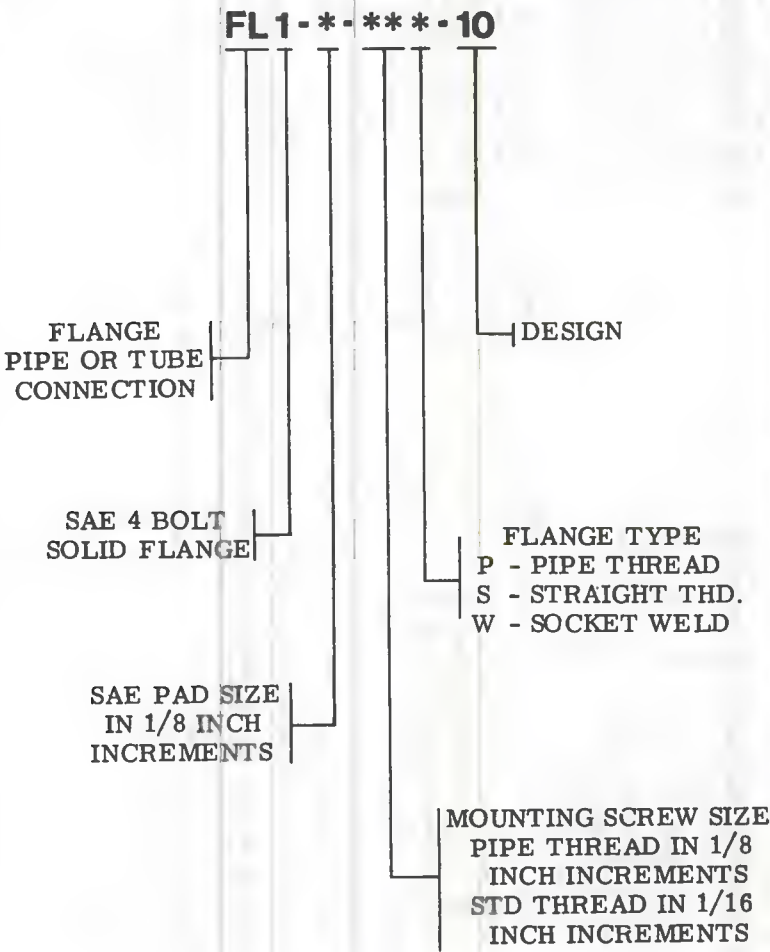
FLANGE (NOT
SOLD SEPARATELY)



ORDER THE FLANGES BY
COMPLETE MODEL NUM-
BER. SEALS AND SCREWS
ARE INCLUDED.

MODEL	PIPE SIZE	SCREW (4 REQ'D)	"O"RING	MAX. PSI PRESSURE
FL1-6-12S-10	3/4	1074	200139	3000
FL1-8-16S-10	1	1075	200143	
FL1-10-20S-10	1-1/4	298150	200145	
FL1-12-24S-10	1-1/2	1116	151296	

MODEL CODE BREAKDOWN



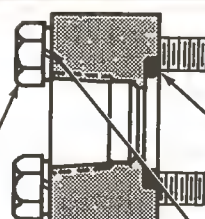
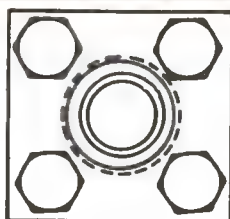
Service Parts Information

VICKERS
A TRIMOVA COMPANY

FLANGES AND FLANGE UNIONS

FLANGES

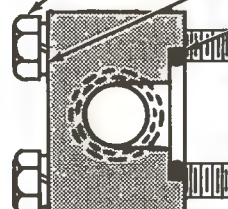
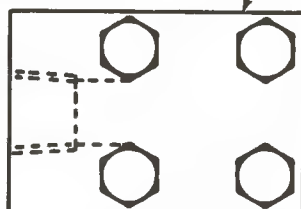
FLANGE WITH THREADED
PIPE CONNECTION.
"PS"=STRAIGHT TYPE



STRAIGHT TYPE

#	MODEL NUMBER	PIPE SIZE	FLANGE	SCREW (4 REQ'D)	SCREW (4 REQ'D)	WASHER (4 REQ'D)	"O" RING
	FL-10-**-20	1-1/4	NOT SOLD SEPA- RATELY	11163	1329	9X-99786	154026
	FL-12-**-20	1-1/2		8876	11171	9X-99788	154082
	FL-16-**-20	2		11181	11183	9X-99790	154090
	FL-20-**-20	2-1/2					
	FL-24-**-20	3					

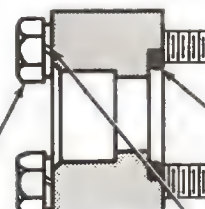
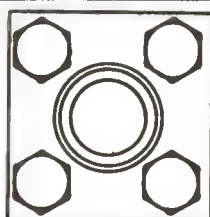
FLANGE WITH THREAD-
ED PIPE CONNECTION.
"PL"=ELL TYPE



ELL TYPE

NOTE: ORDER BY MODEL CODE. USE "PS" OR "PL" IN PLACE OF ASTERISKS (**).

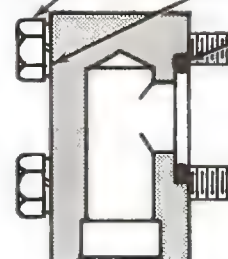
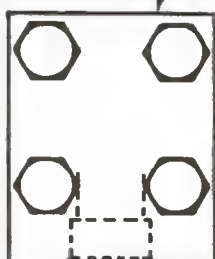
FLANGE WITH SOCKET WELD
PIPE CONNECTION.
"WS"=STRAIGHT TYPE



STRAIGHT TYPE

#	MODEL NUMBER	PIPE SIZE	FLANGE	SCREW (4 REQ'D)	SCREW (4 REQ'D)	WASHER (4 REQ'D)	"O" RING
	FL-10-**-20	1-1/4	NOT SOLD SEPA- RATELY	214710	155971	9X-99786	154026
	FL-12-**-20	1-1/2		214769	214774	9X-99788	154082
	FL-16-**-20	2		214828	214835	9X-99790	154090
	FL-20-**-20	2-1/2					
	FL-24-**-20	3					

FLANGE WITH SOCKET WELD
PIPE CONNECTION.
"WL"=ELL TYPE



ELL TYPE

NOTE: ORDER BY MODEL CODE. USE "WS" OR "WL" IN PLACE OF ASTERISKS (**).

Vickers, Incorporated
P.O. Box 302
Troy, Michigan 48007-0302

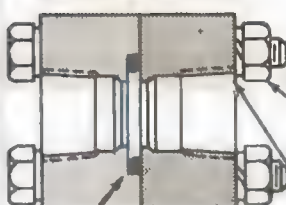
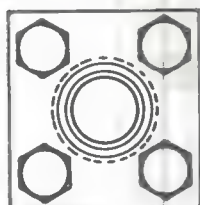
Revised 11-1-85

I-3962-S

THREADED PIPE CONNECTIONS

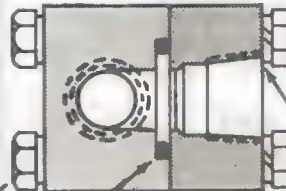
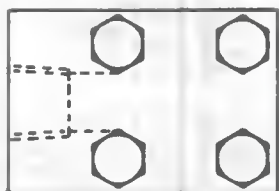
FLANGE UNIONS

STRAIGHT TYPE



#	MODEL NUMBER	PIPE SIZE	FLANGE	SCREW (4 REQ'D)	"O" RING	COMPANION FLANGE	WASHER (4 REQ'D)	NUT (4 REQ'D)
	FLC-10-PS-20	1-1/4	NOT SOLD SEPA- RATELY	11164	154026	NOT SOLD SEPA- RATELY	9X-99786	1458
	FLC-12-PS-20	1-1/2		11171	154082		9X-99788	1462
	FLC-16-PS-20	2						
	FLC-20-PS-20	2-1/2						
	FLC-24-PS-20	3						

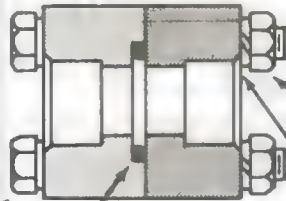
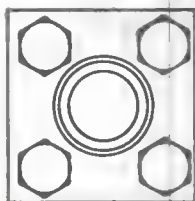
ELL TYPE



#	MODEL NUMBER	PIPE SIZE	FLANGE	SCREW (4 REQ'D)	"O" RING	COMPANION FLANGE	WASHER (4 REQ'D)	NUT (4 REQ'D)	
	FLC-10-PL-20	1-1/4	NOT SOLD SEPA- RATELY	9431	154026	NOT SOLD SEPA- RATELY	9X-99786	1458	
	FLC-12-PL-20	1-1/2		111823	154082		9X-99788	1462	
	FLC-16-PL-20	2							
	FLC-20-PL-20	2-1/2		130239	154090		9X-99790	1466	
	FLC-24-PL-20	3							

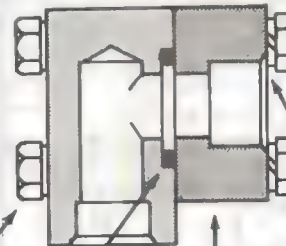
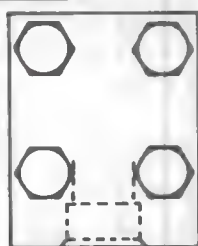
SOCKET WELD PIPE CONNECTIONS

STRAIGHT TYPE



#	MODEL NUMBER	PIPE SIZE	FLANGE	SCREW (4 REQ'D)	"O" RING	COMPANION FLANGE	WASHER (4 REQ'D)	NUT (4 REQ'D)
	FLC-10-WS-20	1-1/4	NOT SOLD SEPA- RATELY	188403	154026	NOT SOLD SEPA- RATELY	9X-99786	1458
	FLC-12-WS-20	1-1/2		214774	154082		9X-99788	1462
	FLC-16-WS-20	2		214835	154090		9X-99790	1466
	FLC-20-WS-20	2-1/2						
	FLC-24-WS-20	3						

ELL TYPE



#	MODEL NUMBER	PIPE SIZE	FLANGE	SCREW (4 REQ'D)	"O" RING	COMPANION FLANGE	WASHER (4 REQ'D)	NUT (4 REQ'D)
	FLC-10-WL-20	1-1/4	NOT SOLD SEPA- RATELY	214714	154026	NOT SOLD SEPA- RATELY	9X-99786	1458
	FLC-12-WL-20	1-1/2		214779	154082		9X-99788	1462
	FLC-16-WL-20	2		247942	154090		9X-99790	1466
	FLC-20-WL-20	2-1/2						
	FLC-24-WL-20	3						

ORDER BY MODEL NUMBER TO GET THE FLANGE AND ALL THE OTHER PARTS LISTED AFTER THE MODEL NUMBER

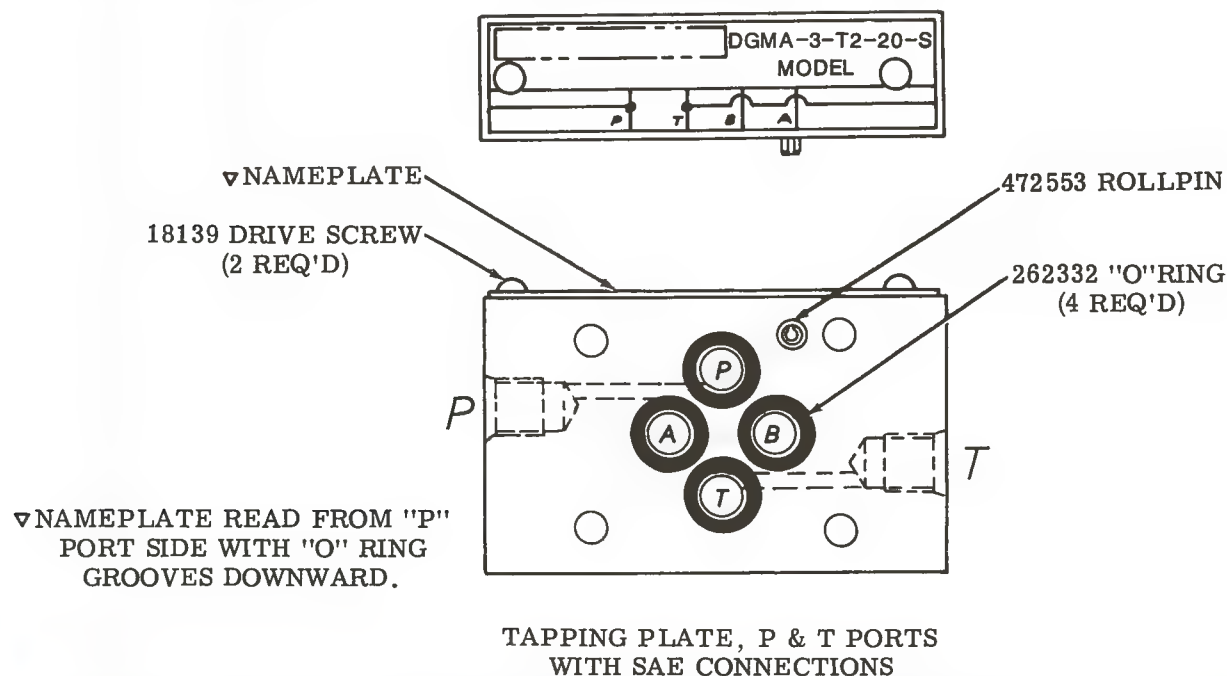
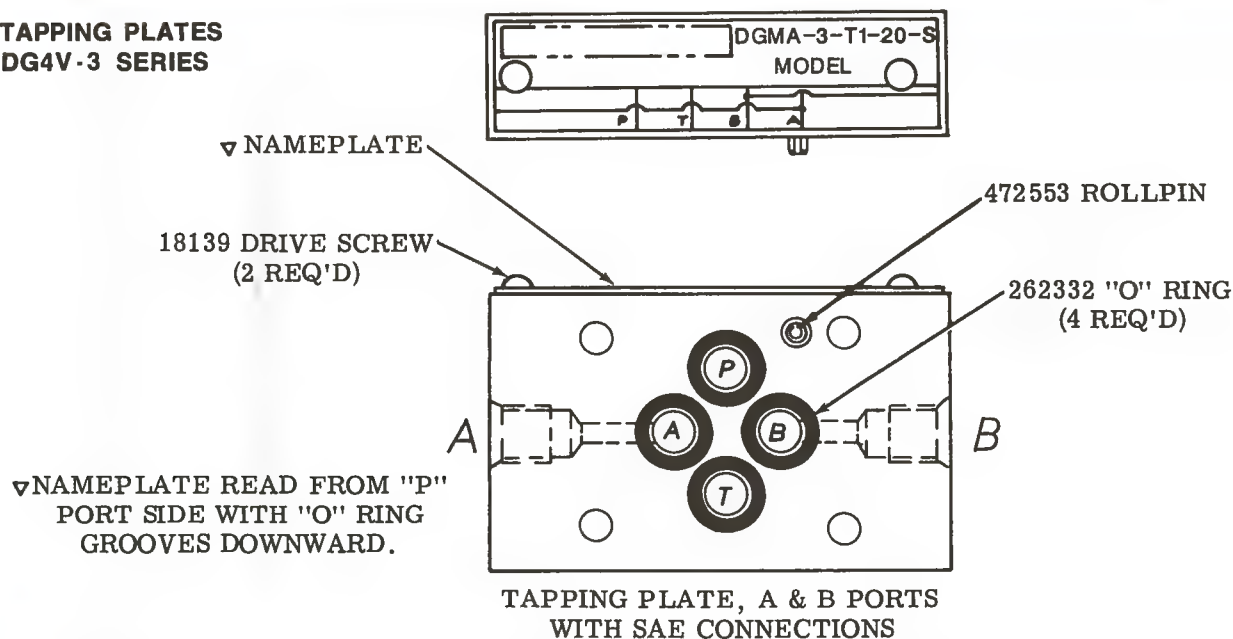
Service Parts Information

VICKERS®

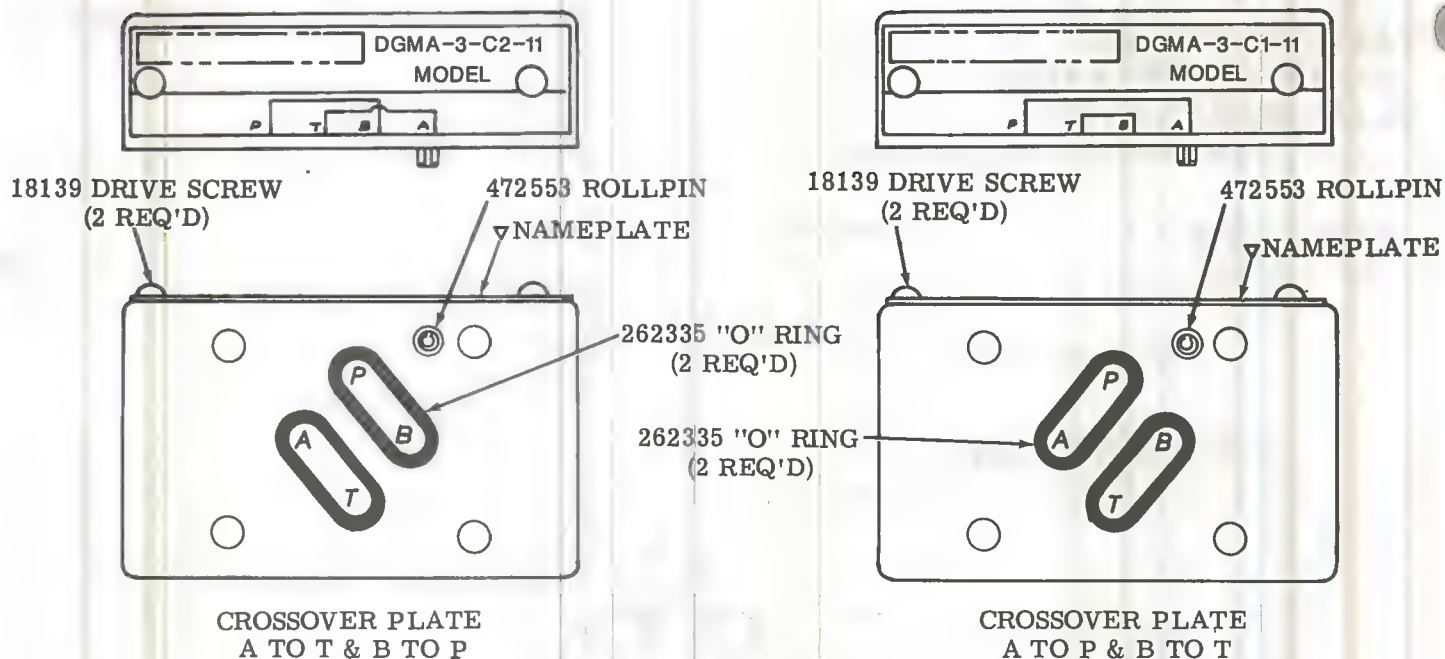
A TRIMONA COMPANY

TAPPING PLATES CROSSOVER PLATES BLANKING PLATES

TAPPING PLATES DG4V-3 SERIES

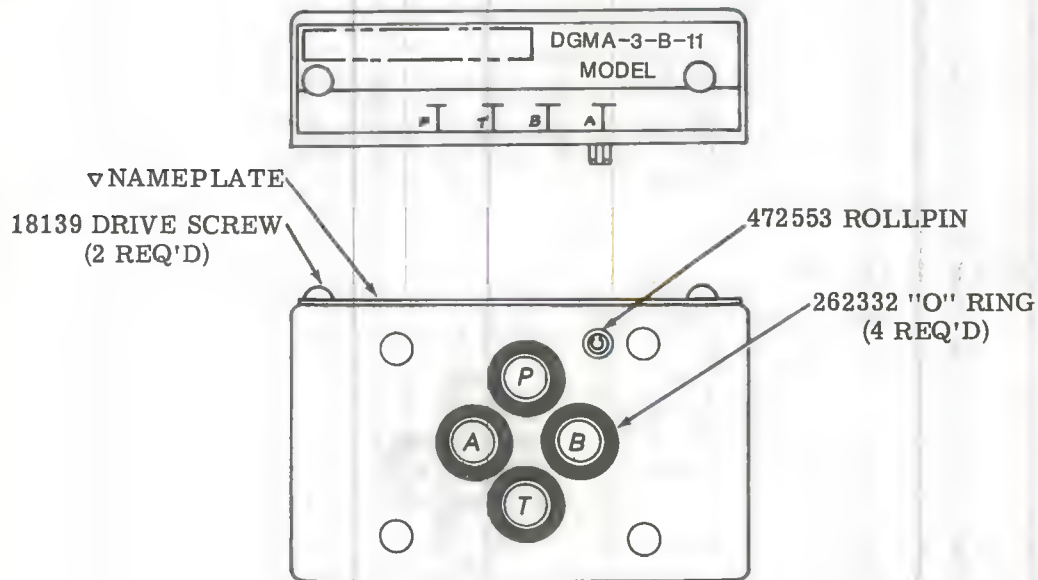


**CROSSOVER PLATE
DG4V-3 SERIES**



▽ NAMEPLATE READ FROM "P" PORT SIDE WITH "O" RING GROOVES DOWNWARD.

**BLANKING PLATE
DG4V-3 SERIES**



BLANKING PLATE

▽ NAMEPLATE READ FROM "P" PORT SIDE WITH "O" RING GROOVES DOWNWARD.

VICKERS®
A TRINNOVA COMPANY

Service Parts Information

**Pressure
Reducing
Module**

DGMX1-3-P*-*W-20



Vickers, Incorporated

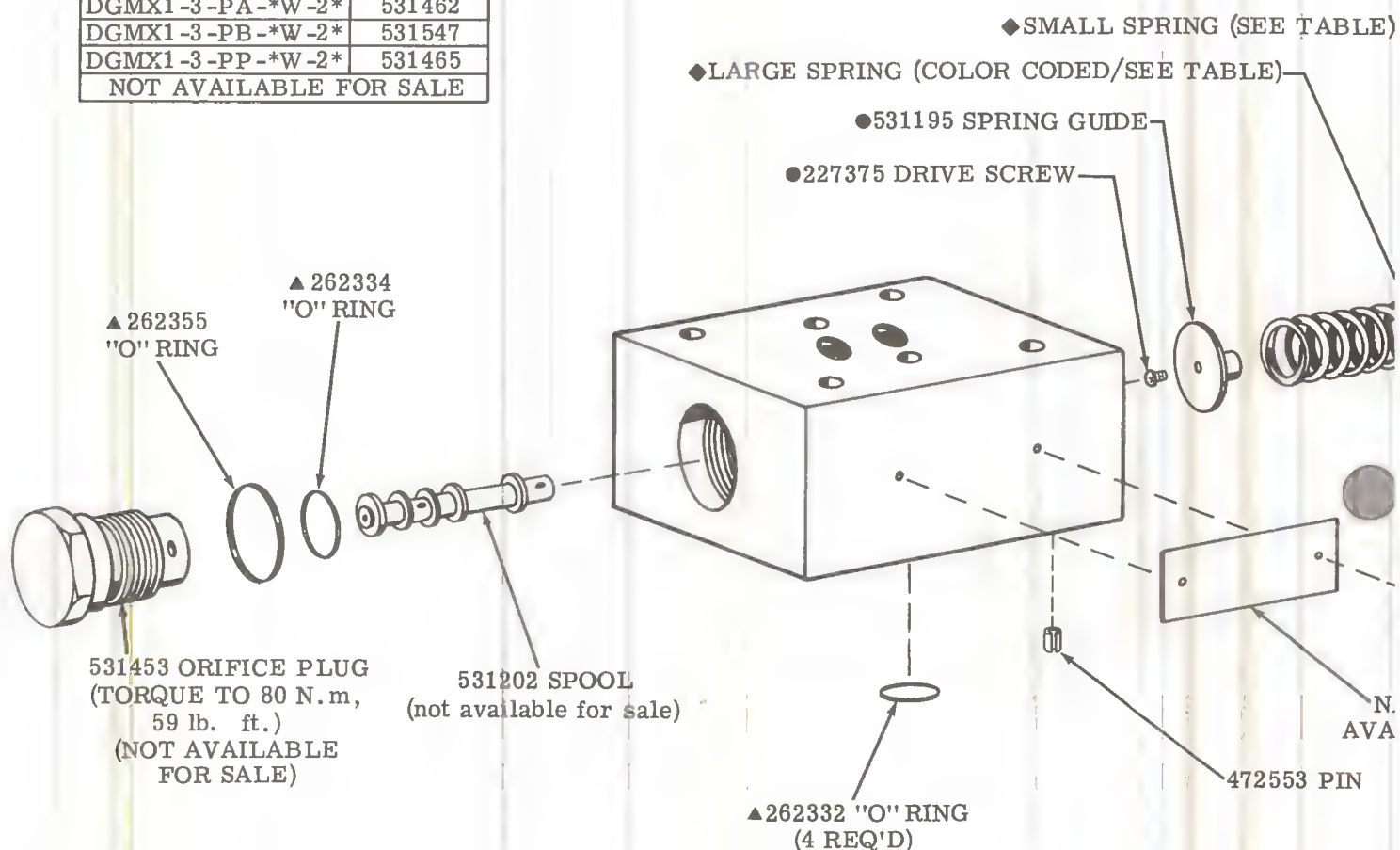
1401 Crooks Road
Troy, Michigan 48084

Revised 9-1-85

I-3391-S

MODEL	SPRING TYPE	LARGE SPRING	SMALL SPRING	PRESSURE RANGE		COLOR CODE
				bar	PSI	
DGMX1-3-P*-AW-2*	A	531150	—	3.5 TO 30	50 TO 425	—
DGMX1-3-P*-BW-2*	B	531203	—	15.0 TO 70	225 TO 1000	BLUE
DGMX1-3-P*-CW-2*	C	531204	531275	15.0 TO 140	225 TO 2000	GREEN
DGMX1-3-P*-FW-2*	F	531206	531205	15.0 TO 250	225 TO 3600	—

MODEL	BODY S/A
DGMX1-3-PA-*W-2*	531462
DGMX1-3-PB-*W-2*	531547
DGMX1-3-PP-*W-2*	531465
NOT AVAILABLE FOR SALE	



● INCLUDED IN
PLUNGER AND
GUIDE KIT 942449

▲ INCLUDED IN
SEAL KIT 920085

INCLUDED IN ADJ. SCREW KIT	
-20	-21
942448	941365

NOTE
REPLACEMENT PARTS FOR
ARE AVAILABLE IN S
PARTS PREFIXED BY AN
TAINED INDIVIDUALLY.

DESIGN	PLUG	SETSCREW	NUT
-20	531192	471151	531541
-21	531611	530601	530532

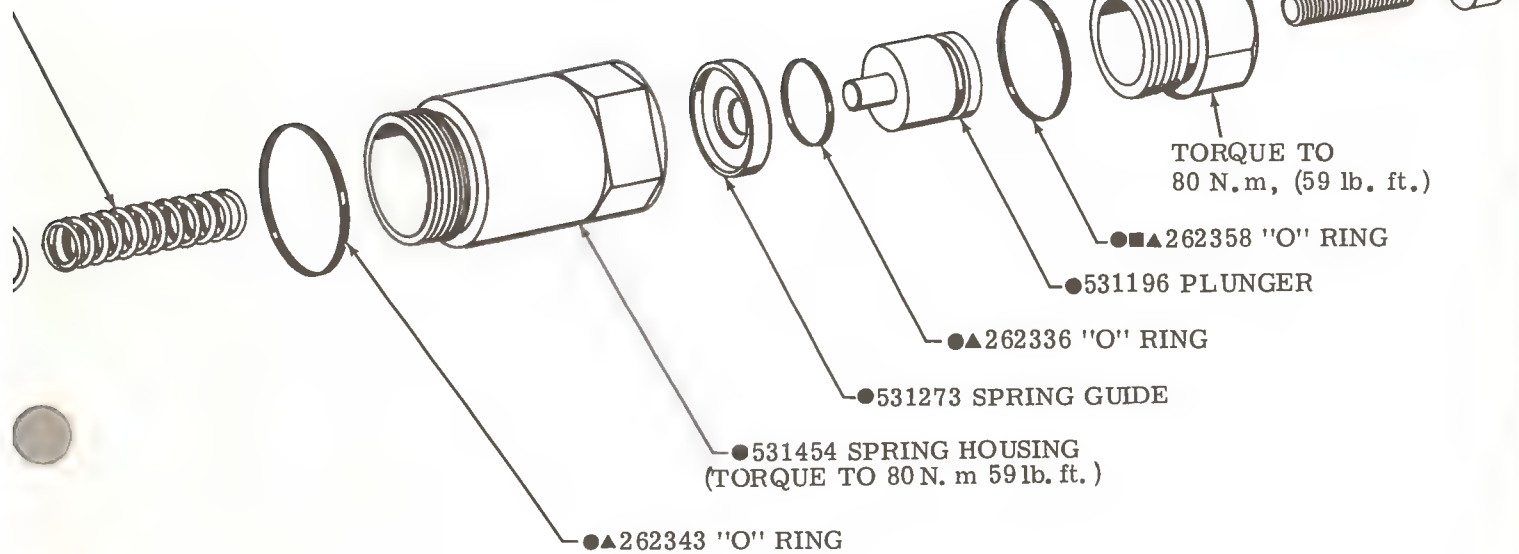
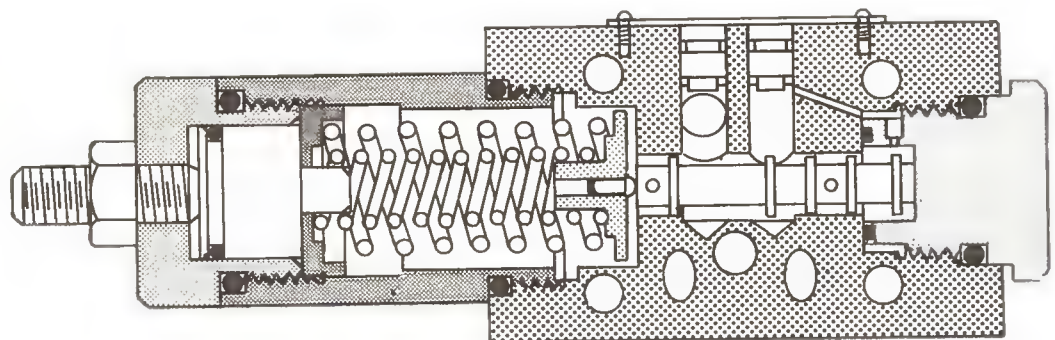
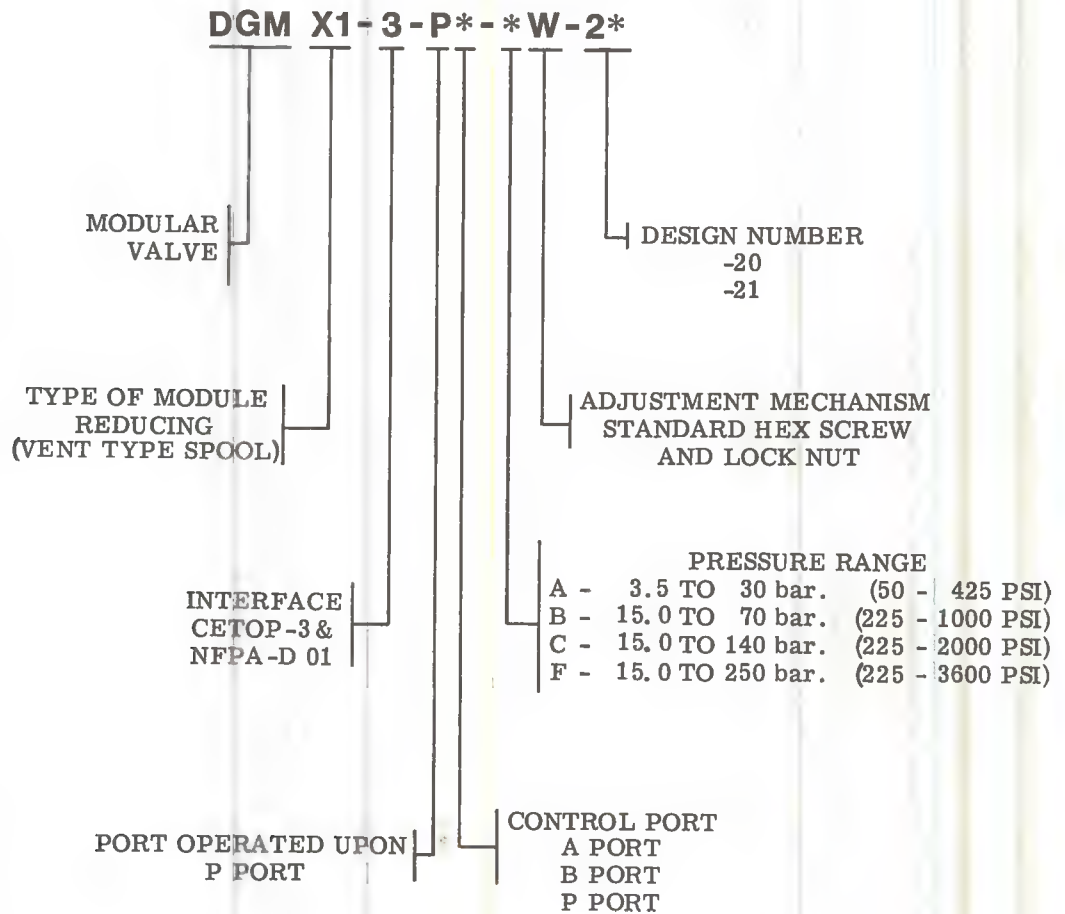


PLATE (NOT
BLE FOR SALE)

THIS UNIT
ICE KITS.
N BE OB-



MODEL CODE BREAKDOWN



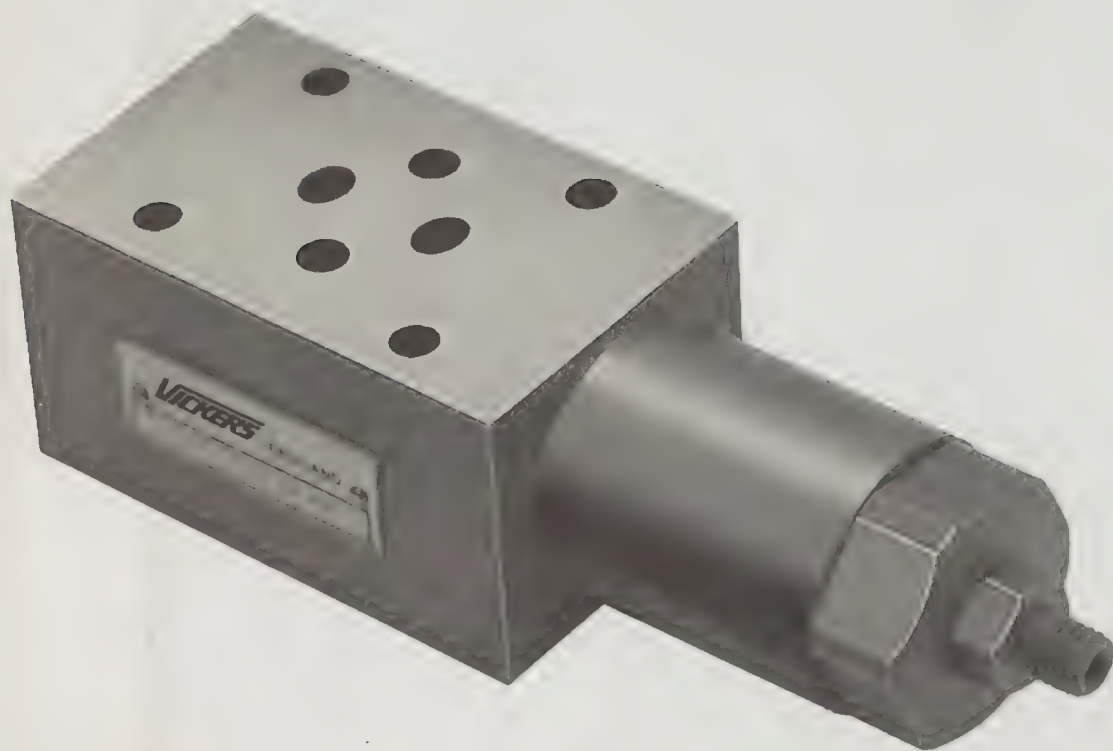
For satisfactory service life of these components in industrial applications, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from Vickers OFP, OFR, and OFRS series are recommended.

Litho in U. S. A.

Service Parts Information

**Counter
Balance
And
Sequence
Modules**

DGMR-3-TA-*W-20
DGMR1-3-PP-*W-20



Vickers, Incorporated

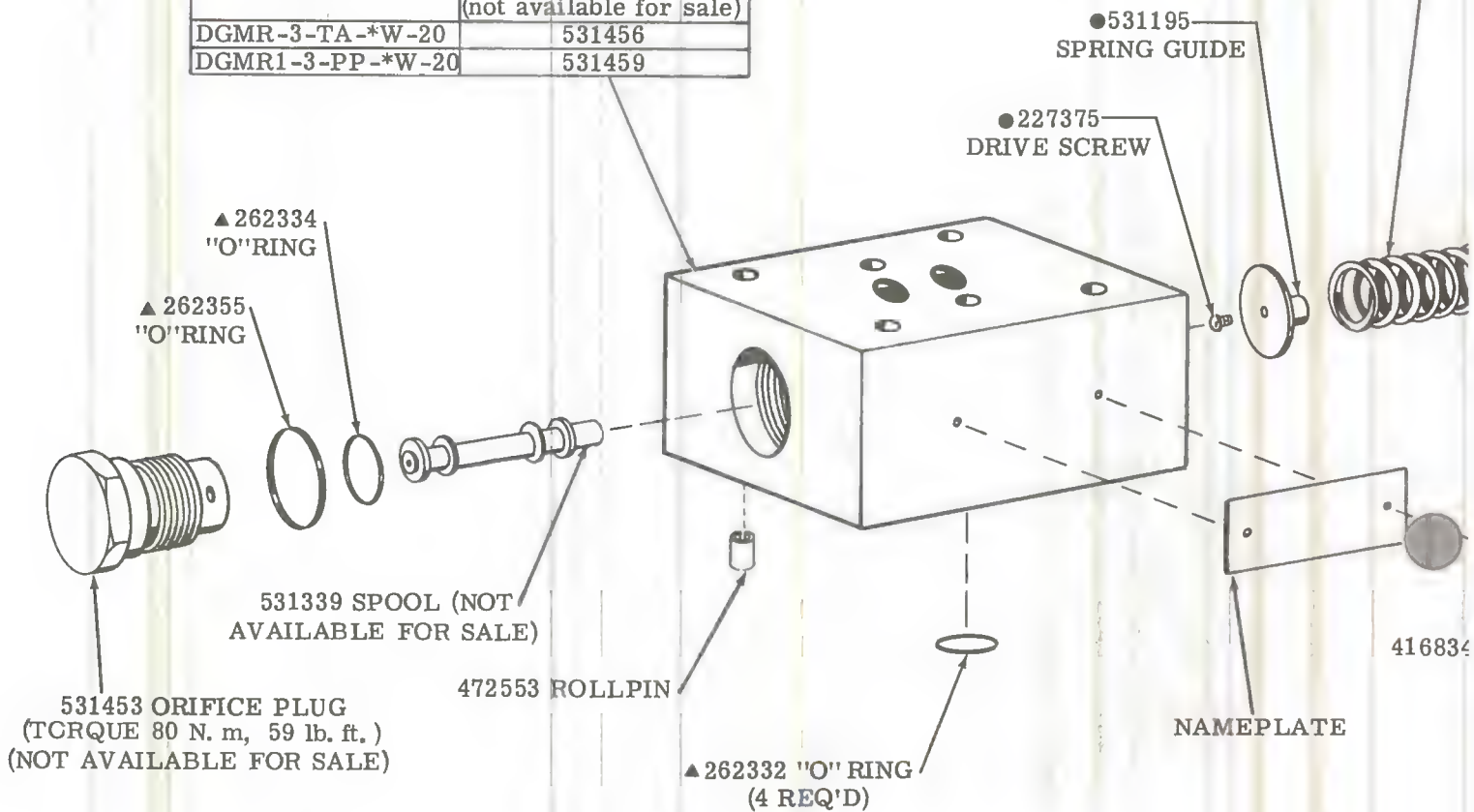
P.O. Box 302
Troy, Michigan 48007-0302

Revised 9-1-85

I-3390-S

MODEL	SPRING TYPE	◆LARGE SPRING	◆SMALL SPRING	PRESSURE RANGE IN BARS	COLOR CODE
DGMR*-3-**-AW-20	A	531150	—	3.5 TO 30 (50 TO 425 PSI)	—
DGMR*-3-**-BW-20	B	531203	—	20.0 TO 70 (300 TO 1000 PSI)	BLUE
DGMR*-3-**-CW-20	C	531204**	531275	50.0 TO 140 (725 TO 2000 PSI)	**GREEN
DGMR*-3-**-FW-20	F	531206	531205	100.0 TO 250 (1450 TO 3600 PSI)	—

MODEL	BODY SUBASSEMBLY (not available for sale)
DGMR-3-TA-*W-20	531456
DGMR1-3-PP-*W-20	531459



▲SERVICE ALL UNITS
W/F3 SEAL KIT 920085

■ INCLUDED IN
ADJUSTMENT
SCREW KIT 942448

● INCLUDED IN
PLUNGER AND
GUIDE KIT 942449

SPRING
(TABLE)

SMALL SPRING
(SEE TABLE)

●▲262343
"O" RING

●531273
SPRING GUIDE

●531196
PLUNGER

●■▲262358
"O" RING

■◆471151
SET SCREW

■◆531541 NUT

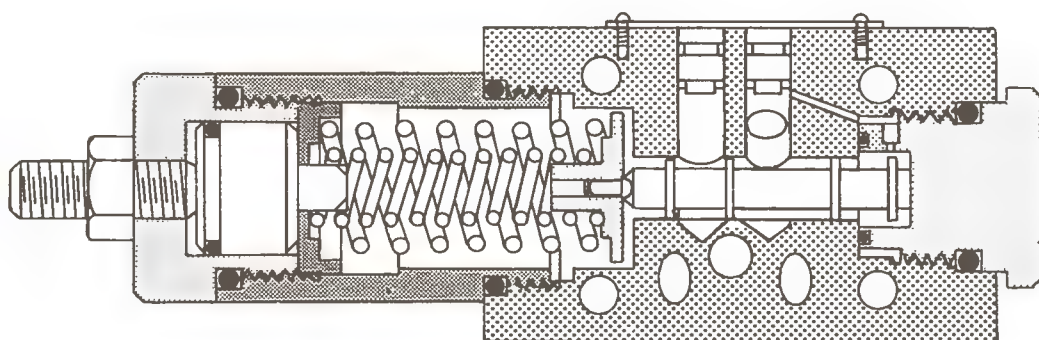
●531454 SPRING HOUSING
(TORQUE TO 80 N. m, 59 lb. ft.)

●▲262336
"O" RING

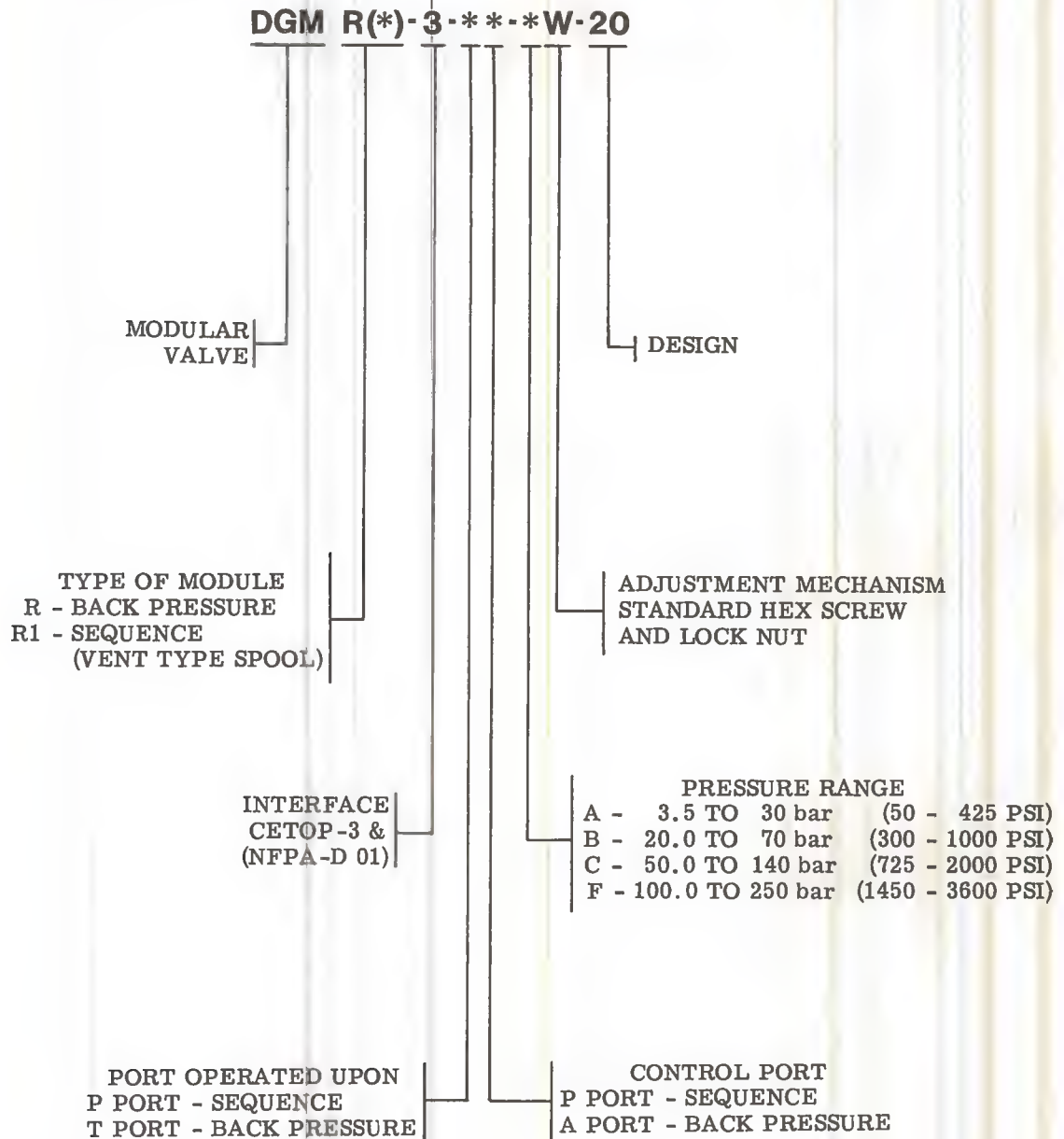
■531192 PLUG (TORQUE
TO 80 N. m, 59 lb. ft.)

ET (2 REQ'D)

NOTE
REPLACEMENT PARTS FOR THIS UNIT ARE AVAILABLE
IN SERVICE KITS. PARTS PREFIXED BY AN◆CAN BE
OBTAINED INDIVIDUALLY. BODIES ARE NOT AVAILABLE
FOR SALE.



MODEL CODE BREAKDOWN



For satisfactory service life of these components in industrial applications, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from Vickers OFP, OFR, and OFRS series are recommended.

Litho in U.S.A.

Service Parts Information

**Bladder
Type
Accumulators**

(F3) A1-75-30
(F3) A1-200-30
(F3) A1-550-30
(F3) A1-1050-30
(F3) A1-2050-30



TABLE OF CONTENTS

SECTION		PAGE
I	INTRODUCTION	
	A. Purpose of Manual	1
	B. Related Publications	1
	C. Model Code	1
II	DESCRIPTION	
	A. General Description	1
	B. Operation	1
III	INSTALLATION & MAINTENANCE	
	A. Installation	2
	B. Placing Accumulator in Service	2
	C. Product Life	2
IV	PRECHARGING PROCEDURE	2
V	OVERHAUL	
	A. Service Tools	3
	B. Troubleshooting Guide	4
	C. Disassembly	4
	D. Cleaning	6
	E. Inspection, Repair & Part Replacement	6
	F. Assembly	6

SECTION I - INTRODUCTION

A. PURPOSE OF MANUAL

This manual provides operating instructions and overhaul information for Vickers -30 design bladder type accumulators. Information contained herein pertains to the latest design series as listed in Table 1.

Model	Assembly No.
A1-75-30	633100
A1-200-30	633101
A1-550-30	633102
A1-1050-30	633103
A1-2050-30	633104

Table 1. Model Series

B. RELATED PUBLICATIONS

Service part information is included in this manual. Installation and performance specifications are not covered in this manual. Overall dimensions and performance data are shown on installation drawing 521801. The installation drawing is available from any Vickers sales engineering office or from:

Vickers, Incorporated
Technical Publications
1401 Crooks Road
Troy, Michigan 48084

C. MODEL CODE

Variations within each model series are described in the model code. The model code is stamped on the accumulator nameplate. See Table 2.

F3	A1 -	* * *			-30
Seals for Mineral Oil and Fire Resistant Fluids	Accumulator Bladder Type	Nominal Size	(Gas Capacity - in. ³)	(Fluid Capacity - Gal.)	Design
		75	61	1/4	
		200	213.6	1	
		550	579.7	2.5	
		1050	1067.9	5	
		2050	2044.2	10	

Table 2. Model Code

Section II - DESCRIPTION

A. GENERAL DESCRIPTION

Vickers industrial type accumulators are made of seamless steel alloy that is shaped into a cylindrical form having spherical ends. Each accumulator contains a Buna type rubber bladder. The bladder is precharged through the valve core with nitrogen gas. The opposite end of the accumulator contains an oil valve which connects into the hydraulic circuit. The oil valve has an SAE straight thread connection. The bladder is protected from wear at the oil valve end by a rubber sealing ring. This sealing ring helps prevent scuffing of the bladder during operation. The shell interior has a 500 micro finish that increases bladder life. Figure 1 is a

typical cross sectional view of a -30 design bladder type accumulator.

B. OPERATION

Operation of the accumulator is automatic. A combination of oil, which is virtually non-compressible, and nitrogen, which can both expand and compress, make the accumulator work. As oil is pumped into the accumulator, it forces the gas to compress until resistance of the gas equals the oil pressure. When the hydraulic system needs oil, the compressed gas forces oil from the accumulator to maintain system flow.

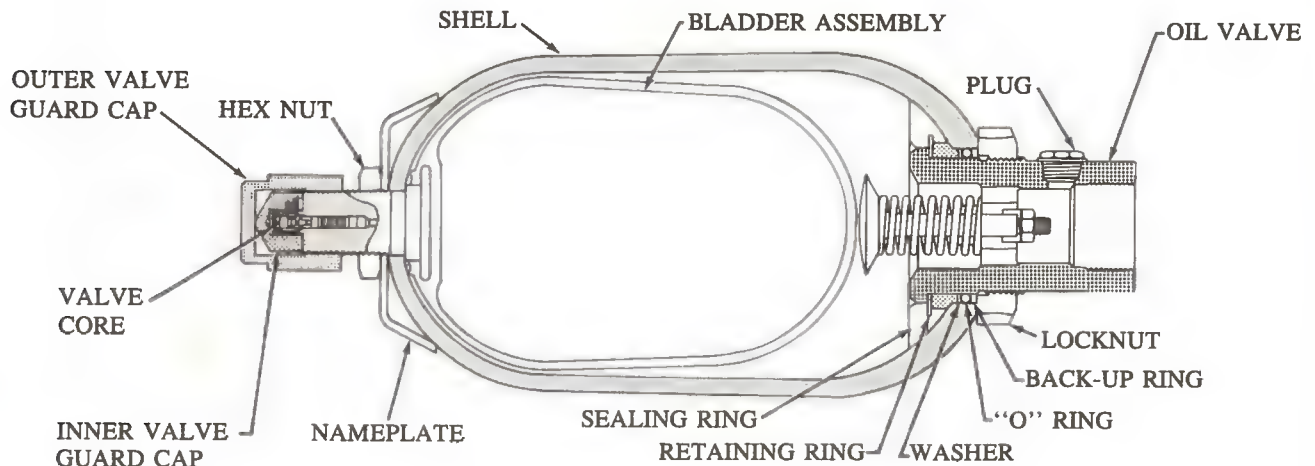


Figure 1. Sectional View

Section III - INSTALLATION & MAINTENANCE

A. INSTALLATION

All accumulators have female connections. If it is necessary to adapt to smaller fittings, forged steel reducer bushings should be used. Vertical mounting of the accumulator is recommended, but horizontal mounting is permissible. A1-75-30 and A1-200-30 accumulators may be mounted in a line unsupported, providing the line can support the charged accumulator and is free from excessive vibration. Supports should be provided whenever possible. Large size accumulators *must* be supported.

NOTE

Before an accumulator is installed in a hydraulic circuit, it should be inspected, supplied with lubrication oil, and pre-charged with nitrogen gas. Refer to Section IV for the accumulator precharge procedure.

CAUTION

NEVER USE OXYGEN GAS IN AN ACCUMULATOR.

NOTE

When the accumulator is installed in a hydraulic circuit, make sure the accumulator lock nuts and the bleeder plug are tight.

B. PLACING ACCUMULATOR IN SERVICE

After a hydraulic circuit has been opened by alterations to the circuit, the circuit should be purged of air. This is accomplished by purging the circuit at its highest point while intermittently operating its components. If purging is desired in the area of the accumulator, it may be accomplished through the optional bleeder plug located on the side of the oil valve. A 1/4 NPTF plug is standard.

CAUTION

DO NOT REMOVE THE BLEEDER PLUG (4) FROM THE ACCUMULATOR. Caution must be used when loosening the bleeder plug, as the oil is under high pressure. Use the bleeder plug to remove extrained air from the accumulator portion of the circuit.

C. PRODUCT LIFE

The service life of this product is dependent upon environment, duty cycle, operating parameters and system cleanliness. Since these parameters vary from application to application, the user must determine and establish the periodic maintenance required to maximize life and detect potential component failure.

Section IV - PRECHARGING PROCEDURE

Precharge the accumulator with nitrogen gas as follows:

1. Remove the outer and inner valve guard cap from the gas valve.
2. Attach a charging hose assembly directly from the nitrogen bottle to the accumulator. Turn the 'T' bar handle inward to depress the valve core of the bladder. The bleeder valve below the pressure gauge **MUST BE CLOSED**. See Figure 2 for charging hose connections. Refer to Table 3 for the appropriate accumulator charging and gauge assemblies.

Model	Ass'y.	Nomenclature
ACGH-0-L-10	579309	No gauge - L.H. female thd.
ACGH-1500-L-10	179442	1500 PSI liquid filled gauge, L.H. female thd.
ACGH-3000-L-10	179443	3000 PSI liquid filled gauge, L.H. female thd.
ACGH-0-R-10	579310	No gauge - R.H. male thd.
ACGH-1500-R-10	579311	1500 PSI liquid filled gauge, R.H. male thd.
ACGH-3000-R-10	579312	3000 PSI liquid filled gauge, R.H. male thd.

Table 3. Accumulator Charging & Gauging Assemblies

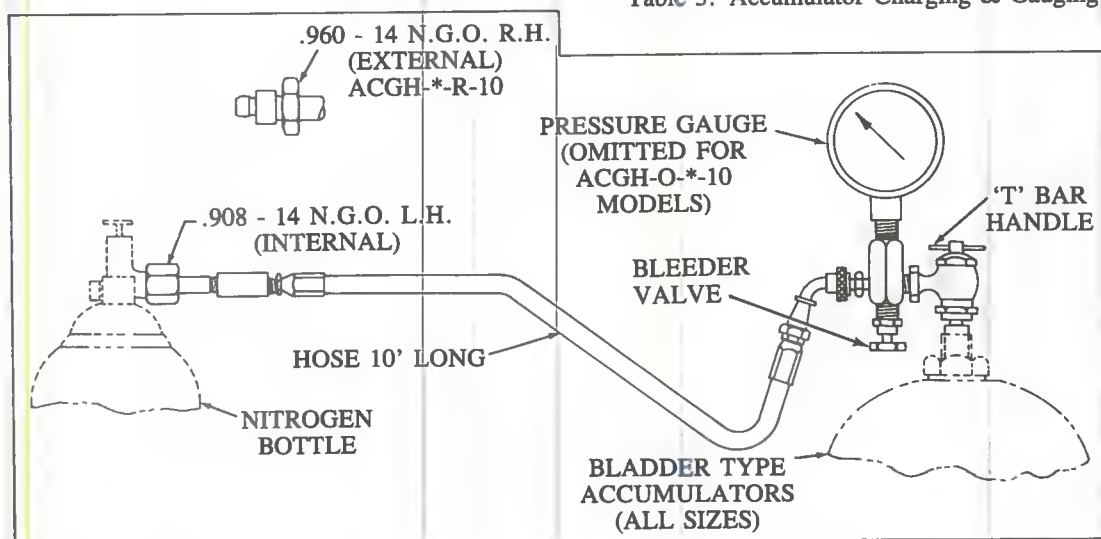


Figure 2. Accumulator Charging & Gauging Device.

3. Open the valve on the nitrogen bottle slowly allowing nitrogen to flow to the accumulator. Intermittently close the valve to allow the accumulator gauge to settle. Precharge pressure will vary with each application, but must not be less than one quarter ($\frac{1}{4}$) or preferably one third ($\frac{1}{3}$) of the maximum working pressure.

If an accumulator is to be used for absorbing pump pulsations or line shocks, it should be precharged to 60 percent of the mean line pressure and installed as near the source of shock as possible.

4. When the required pressure is reached, maintain for two minutes then read the gauge again. As the nitrogen equalizes in the accumulator, a slight pressure drop will be observed. Slowly open the charging valve again and bring pressure up to the desired reading.

5. Close valve on the nitrogen bottle securely. Turn the "T" bar handle at the accumulator outward to release the valve core. Open the bleeder valve, then remove the charging hose assembly.

6. Carefully test accumulator gas connection for leakage

by pouring system fluid in and around the valve core area. Tighten any loose connections. If the core leaks, depress and release the core rapidly to reseal the valve core. No leakage can be tolerated in this area. Replace the core if leakage cannot be stopped.

7. Install a shut-off valve between the accumulator oil port and the main line. Action of the accumulator on the hydraulic circuit can be stopped by means of this valve. Another shut-off valve should be installed between the accumulator and the reservoir. These valves provide a means of isolating and draining the accumulator in the event that servicing is required.

8. Install the accumulator in an accessible location for ease of maintenance.

9. Install a check valve between the pump and accumulator to prevent pump reversal. Other valves may be installed between the check valve and the pump for unloading after maximum circuit pressure is attained.

10. **DO NOT** weld supports to the accumulator shell.

Section V – OVERHAUL

A. SERVICE TOOLS

The following list of service tools are required to overhaul a Vickers bladder type accumulator. Special service tools are shown in Figure 3.

1. 10" adjustable wrench
2. A small, thin blade screwdriver
3. A medium size screwdriver
4. Compressed air
5. Cleaning solvent (methylated spirits or water)
6. Soap solution with brush applicator

7. Heavy duty vise with padded jaws (use on smaller accumulators)
8. Chain vise (use on larger accumulators)
9. A clean, sturdy work bench
10. Spanner wrench (see Figure 3)
11. Valve core tool (see Figure 3)
12. Clean, system fluid
13. Safety glasses
14. A medium size funnel
15. Nitrogen gas
16. Accumulator charging devise (see Figure 2 and Table 3)
17. Flashlight

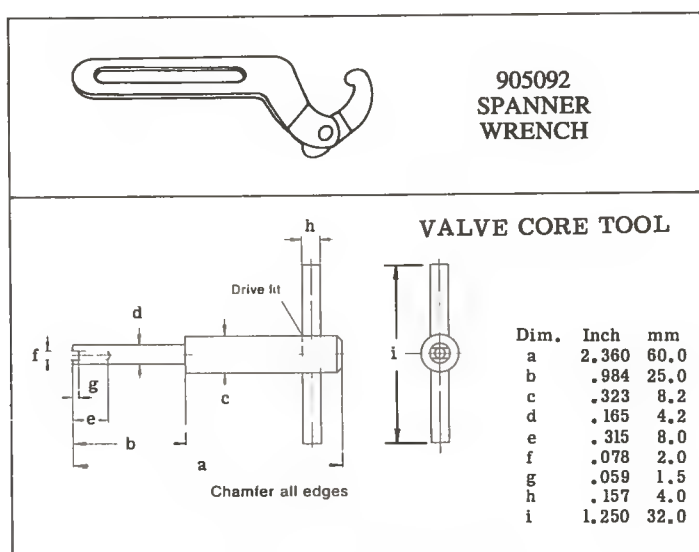


Figure 3. Special Service Tools

B. TROUBLESHOOTING GUIDE

CAUTION

Make sure the accumulator is not subject to hydraulic pressure before removing it from the circuit.

The following chart (Table 4) provides types of accumulator problems, probable causes, and repair solutions. In most cases, accumulator overhaul requires the replacement of the bladder and anti-extrusion ring assembly. Note that improper operating conditions may cause accumulator failure. If this is the case, make sure that the operating conditions are corrected before placing the accumulator into service.

TYPE OF PROBLEM	PROBABLE CAUSE	REPAIR SOLUTION
External Leakage:		
1. Gas valve leaks.	Damaged or broken gas valve core.	Replace valve core or bladder.
2. Gas valve leaks.	Loose connection at accumulator gas valve.	Tighten connection.
3. Oil valve leaks.	Damaged or missing seals.	Replace with new anti-extrusion ring kit.
4. Oil valve leaks.	Loose connection, damaged threads, improper oil valve function.	Tighten connection or replace oil valve.
Internal Leakage:		
1. Bladder leaks at vulcanized seam.	Foreign material introduced into bladder Manufacturing or material fault.	Replace bladder. Check system for cleanliness.
2. Bladder is charred, brittle, or porous.	Working pressure ratio too high causing excessive nitrogen and oil temperature.	Replace bladder. Check working pressure parameters.
3. Cracks at center portion of bladder.	Material fatigue.	Replace bladder.
4. Hole in bladder.	Damaged at assembly, or charge pressure too low causing hole in bladder.	Replace bladder. Check accumulator charge pressure.

Table 4. Troubleshooting Guide

C. DISASSEMBLY

Disassemble the accumulator by item sequence number as shown in Figure 4. Place accumulator parts on a clean surface for inspection.

CAUTION

WEAR SAFETY GLASSES TO PREVENT POSSIBLE EYE INJURY.

1. For smaller size accumulators, clamp the oil valve (10) portion of the accumulator in a heavy duty vise. Protect the oil valve by inserting two flat pieces of steel between the oil valve and the vise jaws. For larger size accumulators, secure the accumulator in a chain vise.

2. Remove outer and inner valve guard cap (1 & 2) to expose core (3).

3. Press on valve core (3) to release gas from the accumulator bladder.

4. Remove valve core (3) with the valve core tool shown in Figure 3.

5. Loosen hex nut (11).

6. Remove slotted nut (4) with a spanner wrench.

7. Remove accumulator from vise and secure on a clean, sturdy work bench.

8. Remove and discard back-up ring (5), o-ring (6), and washer (7) from oil valve (10). Use a thin bladed screwdriver.

9. Push oil valve (10) into accumulator shell (14) until retaining ring (8) and sealing ring (9) are exposed.

10. Reach into shell and align the two flat surfaces of retaining ring (8) with shell opening. Remove retaining ring from shell.

11. Reach into shell and remove sealing ring (9) from shell. Bend or compress the sealing ring to facilitate removal.

12. Remove oil valve (10) from shell (14).

13. Remove hex nut (11) and nameplate (12).

14. Reach into shell opening and remove bladder (13). Slightly fold and twist the bladder for easier removal. If the bladder is very slippery, hold onto bladder with a clean rag.

Item No.	Part Name	Part Numbers				
		Model A1-75-30 (1 Quart)	Model A1-200-30 (1 Gallon)	Model A1-550-30 (2.5 Gallon)	Model A1-1050-30 (5 Gallon)	Model A1-2050-30 (10 Gallon)
1	Outer Valve Guard Cap ☉ ●	682428	682428	682428	682428	682428
2	Inner Valve Guard Cap ☉ ●	682427	682427	682427	682427	682427
3	Valve Core ●	682450	682450	682450	682450	682450
11	Hex Nut ●	682426	682426	682426	682426	682426
12	Nameplate	682415	633106	633107	633107	633107
13	Bladder Assembly STD. ● F3	926380 926573	926381 926574	926382 926575	926383 926576	926384 926577
14	Shell (Not for sale)	—	—	—	—	—
4	Slotted Nut ○	○(STD.) 926385 (F3) 926578	○(STD.) 926386 (F3) 926579	○(STD.) 926387 (F3) 926580	○(STD.) 926387 (F3) 926580	○(STD.) 926387 (F3) 926580
5	Backup Ring ○					
6	“O” Ring ■ ○					
7	Washer ○					
8	Retaining Ring ○					
9	Sealing Ring ○					
10	Oil Valve Kit STD. ■ F3	926496 926581	926497 926582	926498 926583	926498 926583	926498 926583

- Included in STD. bladder assembly.
F3 equivalent bladder assembly.
- ☉ Included in valve guard cap kit 926532
- Included in STD. anti-extrusion ring kit.
F3 equivalent anti-extrusion ring kit.
- Included in STD. oil valve kit.
F3 equivalent oil valve kit.

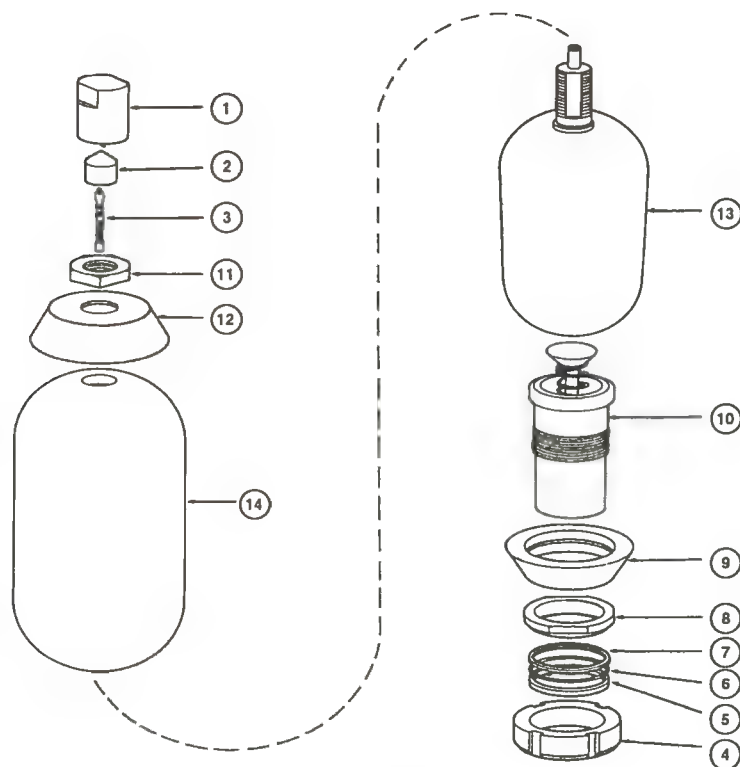


Figure 4. Exploded View

D. CLEANING

Wash all parts, except bladder (13), sealing ring (9), and o-ring (7) with trichloroethylene or a suitable cold cleansing agent. Wash bladder (13) with methylated spirits or water. Dry off parts for inspection.

E. INSPECTION, REPAIR & PART REPLACEMENT

1. Discard rubber seals and obtain a new anti-extrusion ring kit. Refer to Figure 4 for the kit part number.

2. Visually inspect accumulator bladder (13) for holes, cracks, charring, and distortion. Replace the bladder if any of the preceding conditions are evident. If the bladder seems to be in good condition, perform step 3.

3. Check the bladder for leaks as follows:

a. Screw valve core (3) into bladder.

b. Inflate the bladder with filtered compressed air to 1.4 times its size.

c. Apply a soap solution to the entire bladder surface, including the valve core area. Carefully check the bladder surface and valve core area for leaks. **NO LEAKS ARE ALLOWED.** Replace the bladder if a leak is detected.

4. Inspect oil valve (10) for damaged threads, burrs, and rust spots. Remove minor burrs with an India stone. Check the plunger and spring within the oil valve for proper function. Replace the oil valve if damaged threads, rust spots, or improper plunger/spring action are noted.

5. Inspect both shell (14) openings for burrs. Remove minor burrs with an India stone. Use a flashlight to inspect inside of shell. Check for cracks, scratches, or burrs. If condition of shell is questionable, replace the accumulator.

6. Inspect all other parts for wear and/or damage. Replace any part that looks worn or damaged.

F. ASSEMBLY

Assemble the accumulator in reverse item number sequence as shown in Figure 4. Perform the following steps:

1. Attach the valve core tool to the gas valve portion of bladder (13).

2. Wet inside of shell (14) and outer surface of bladder (13) with clean, system fluid.

3. Fold bladder (13) lengthwise and carefully insert it into oil valve opening of shell. Reach into gas valve opening of shell and grip the valve tool with pliers. Pull on the valve core tool until the gas valve portion of bladder protrudes out of gas valve opening of shell.

4. Insert nameplate (12) over the gas valve and onto shell.

5. Apply a small amount of oil to threads of hex nut (11). Screw hex nut (11) onto gas valve portion of bladder, hand tight. Remove the pull rod.

6. Reach into shell and press on the bladder to remove air from inside of bladder. Thread inner valve guard cap (2) onto gas valve portion of bladder while pressing on bladder. This will prevent the bladder from expanding during installation of anti-extrusion assembly (items 10 thru 5).

7. Dip the shoulder end of oil valve (10) and the sealing ring (9) into clean, system fluid. Hold onto threaded portion of oil valve and position the shoulder end of oil valve into shell opening. Next, fold sealing ring (9) and insert it into shell opening behind the oil valve. Push on the oil valve until the sealing ring fits uniformly around the shoulder end of oil valve.

8. Insert retaining ring (8) into shell opening and onto oil valve (10). Center the retaining ring against the sealing ring. Pull the oil valve outwards through the shell opening.

9. Remove inner valve guard cap (2). Install valve core (3) into gas valve portion of bladder with the valve core tool.

10. Fill bladder (13) with compressed air while centering the oil valve and retaining ring at opposite end of accumulator shell.

11. Wrap masking tape around threaded portion of oil valve (10).

12. Install washer (7), o-ring (6), and back-up ring (5) onto oil valve. Push the o-ring and back-up ring uniformly into shell with a blunt screwdriver. Remove the masking tape and apply a small amount of oil to the oil valve threads.

13. Screw slotted nut (4) onto oil valve (10). Tighten the nut securely with a spanner wrench. (Note: Make sure the oil valve does not turn while tightening the slotted nut. Secure the oil valve with a vise or large wrench.)

14. Apply a small amount of oil to pipe (bleeder) plug (4) threads. Screw the plug into oil valve (10).

15. Push on valve core (3) to release air from bladder (13). Remove the valve core to insure all the air is released from bladder. Reinstall the valve core.

16. Install inner valve guard cap (2) over the valve core.

17. Pour a liberal amount of system fluid (approximately 1/10th accumulator content) into oil valve port. Use a funnel for this operation. This step insures the proper lubrication of the bladder and inner shell surface. Roll the accumulator back and forth two or three times. Drain off the fluid. Remove inner valve guard cap (2).

18. Pre-charge the accumulator with nitrogen to approximately 10 PSI. Follow accumulator pre-charge instruction in Section IV. Tighten hex nut (11). Continue to pre-charge the accumulator until the correct pressure for your application is obtained.

19. Apply a soap solution to the valve core area of the accumulator. Check for leaks. **NO LEAKS ARE ALLOWED.** If the accumulator does not accept a pre-charge, refer to the troubleshooting chart (Table 4) for possible repair solutions.

20. Install inner valve guard cap (2) and outer valve guard cap (1).

21. When the accumulator is placed into service, refer to Section III-Installation & Maintenance and the installation drawing for proper instructions.

22. Check the pre-charge pressure within a week of initial pre-charge. The pressure should be checked with zero hydraulic pressure on the circuit. Disconnect the accumulator from the circuit by turning off the line valve and opening the valve to the reservoir.

Service Parts Information

PRESSURE
SWITCHES

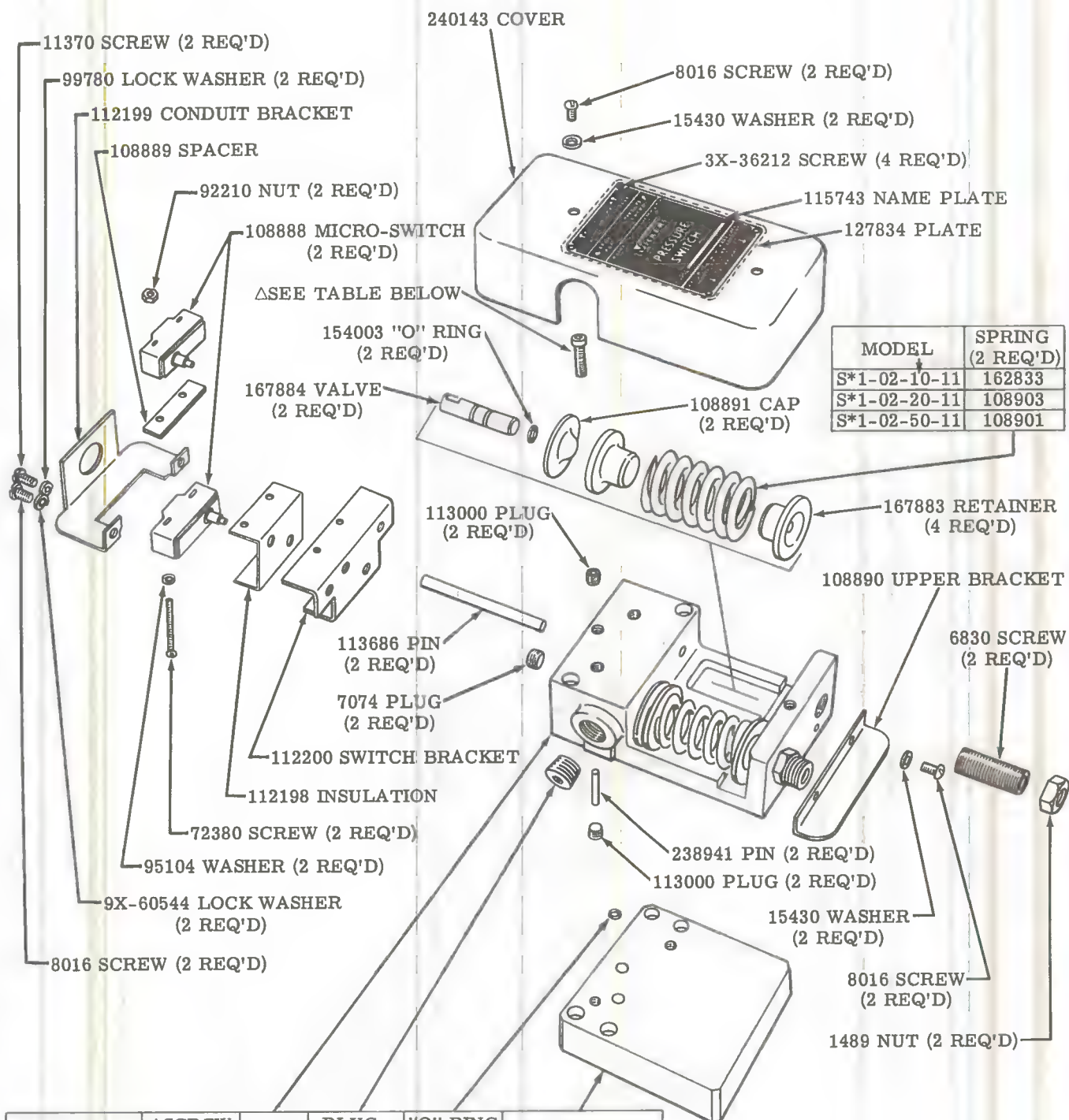
SG1-02-* -1*
ST1-02-* -1*



PRESSURE SWITCHES

SG1-02-*0-11

ST1-02-*0-11

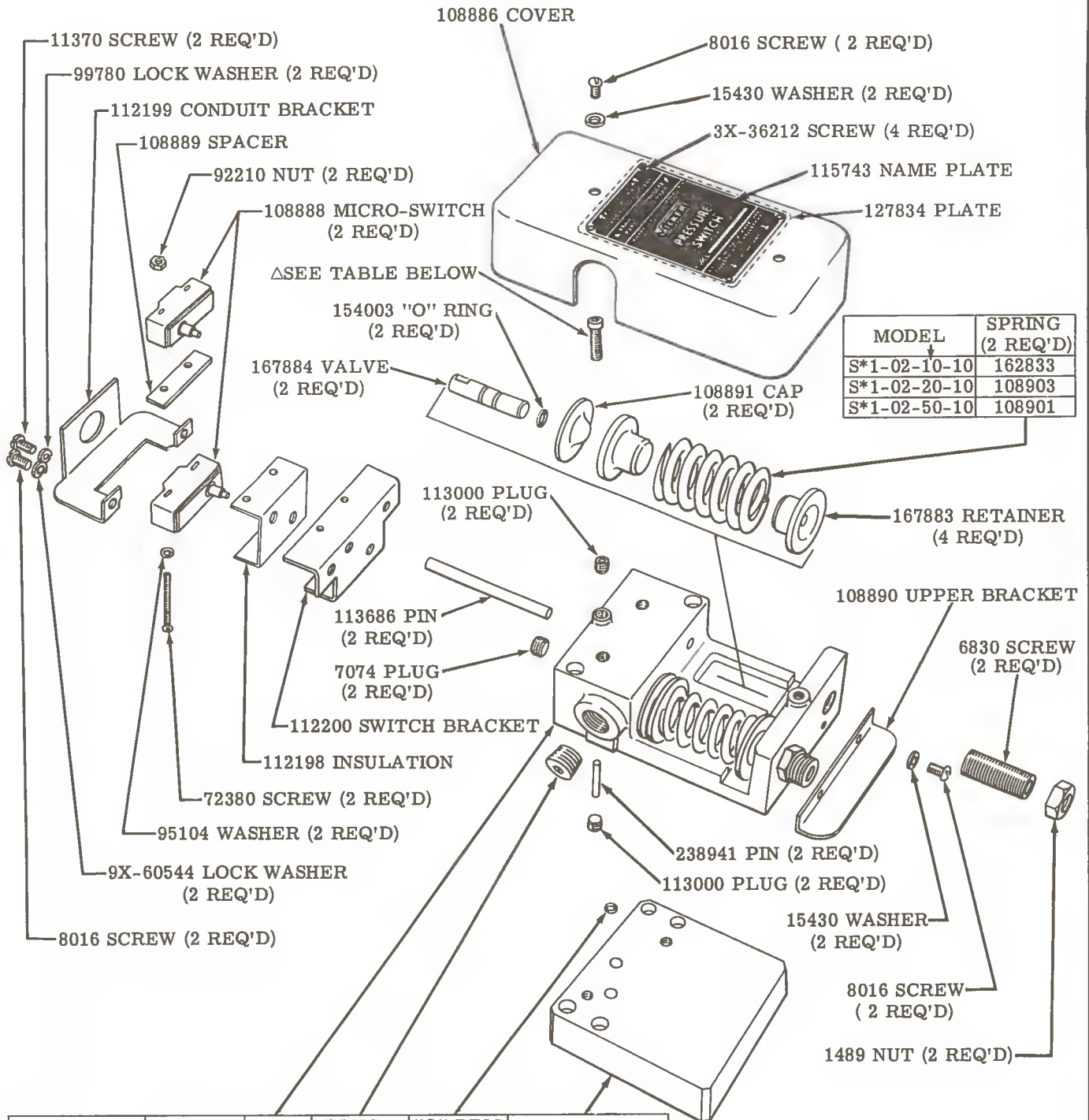


MODEL	ΔSCREW (2 REQ'D)	BODY	PLUG (2 REQ'D)	"O" RING (2 REQ'D)	SUB-PLATE
SG1-02-*0-11	1036	240042	7075	124582	169161
					SG1SM-02-10
					183627
ST1-02-*0-11	—	235298	—	—	SG1SM-8S-02-10

PRESSURE SWITCHES

SG1-02-*0-10

ST1-02-*0-10



MODEL	ΔSCREW (2 REQ'D)	BODY	PLUG (2 REQ'D)	"O" RING (2 REQ'D)	SUB-PLATE
SG1-02-*0-10	1036	169162	7075	124582	169161
					SG1SM-02-10
					183627
ST1-02-*0-10	—	108885	—	—	SG1SM-8S-02-10

MODEL CODE BREAKDOWN

S*1	02	*0	1*
1	2	3	4
1	Mounting		
G - Gasket Mounted T - Threaded Connection			
2	Connections		
1/4 Inch Connections			
3	Pressure Range		
10 - 100 - 1000 PSI 20 - 100 - 2000 PSI 50 - 500 - 5000 PSI			
4	Design		
10 Design 11 Design			

For satisfactory service life of these components, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from OFP, OFR and OFRS filter series are recommended.

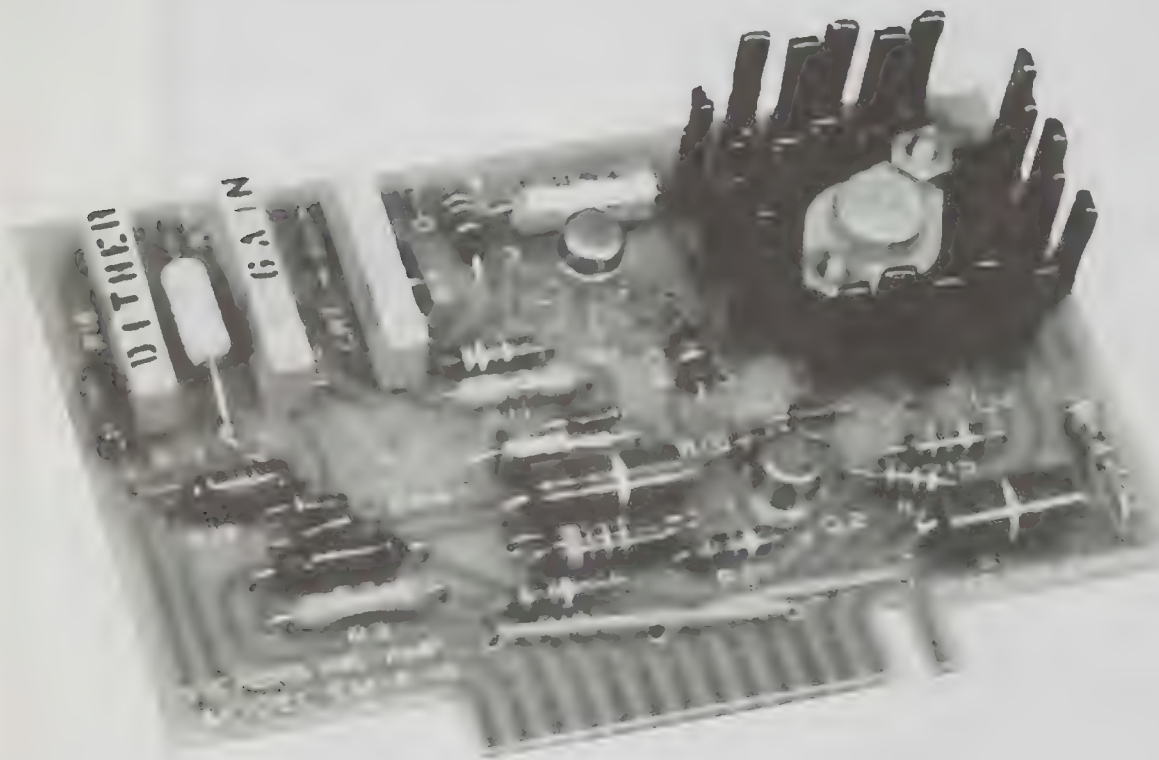
Litho in U.S.A.

VICKERS®
A TRINOVIA COMPANY

Service Parts Information

**SINGLE ENDED
LINEAR DC
SERVO
AMPLIFIER**

EM-A-10



Vickers, Incorporated

P.O. Box 302
Troy, Michigan 48007-0302

Revised 9-1-87

I-3081-S

GENERAL: This manual is written primarily to establish a logical troubleshooting procedure for the solid state EM (electronic modular) amplifier. Complete systems are beyond the scope of this manual

and will not be covered. Adequate information is presented for an Electronic Technician to repair the EM-A-10 amplifier.

EM-A-10 (308118) LINEAR SERVO AMPLIFIER

A. DESCRIPTION: The EM-A-10 is a special purpose DC servo amplifier designed specifically for a Vickers SE3 or SF4 flapper type servo valve. The EM-A-10 consists of a high gain summing amplifier, a low gain DC amplifier and a power output stage.

The amplifier module also contains a ± 10 volt

regulated power supply which may be used for development of input signals through an external 5000 ohm potentiometer.

The complete amplifier and power supply are contained on a plug-in module whose approximate dimensions are 3-1/2 x 5 inches. Refer to Table 1 for electrical and mechanical specifications.

B. SPECIFICATIONS - Performance at 25°C and with rated supply.

	Min.	Typ.	Max.	Units
Input Impedance				
5	4.95	5	5.05	K Ω
4	49.5	50	50.5	K Ω
Input Signal Level	-100	0	+100	V _{peak}
Gain: Continuously				
Adjustable: Input 5	2		20	Amps/volt
Input 4	0.20		2	Amps/volt
Output	Single ended with respect to common			
Output Current				
20 Ω load	20	200	400	MA
Output current limits	-20		500	MA
Dither current adjustable	3		100	MAp-p
Output drift at max. gain				
During warm-up (30 min.)			± 30	MA
vs. temperature			± 1	MA/°F
vs. time (after 30 min)			± 10	MA/24 hrs.
vs. supply voltage			± 1	MA
Frequency Response				
DC - 300 Hz max.			-3	DB
gain full load				
	Min.	Typ.	Max.	Units
Regulated Output				
Supply into 500 Ohm load				
Pin 7 to common	+9	+10	+11	Vdc
Pin 8 to common	-9	-10	-11	Vdc
Temperature Range				
Operating	-29		+71	°C
Storage	-40		+85	°C
Power Supply Requirements				
Voltage Range	+14	+19	+20	Vdc
	-14	-19	-20	Vdc
MECHANICAL SPECIFICATIONS				
Module	Special printed circuit card			
Module Size	5.0" x 3.5" x 1.0"			
Module Weight	8 oz.			
Controls	Screwdriver Adjusted			
	Dither			
	Gain			

Table 1. Electrical and Mechanical Specifications for the EM-A-10.

C. INSTALLATION: The EM-A-10 servo amplifier is designed for mounting on a power supply plate such as the EMP-A-11. Input and output connections to the amplifier circuitry are provided by printed circuit pin connections on the module. These pin connections,

when installed into a plug-in receptacle, must be connected as shown in Table 2. TB2 wiring interconnections, located on the EMP-A-11 power supply plate, are shown for convenience.

EMP-A-11 TB2 (J)A/(J)B/(J)C	Plug-In receptacle pin connections	Plug-In module pin connections	Signal
-	a	1	Dither (13 Vac)
-	b	2	N. C.
-	c	3	-19 Vdc input
4	d	4	Input #1
5	e	5	Input #2
6	f	6	Summing Junction
7	h	7	Regulated +DC output
8	j	8	Regulated -DC output
-	k	9	N. C.
-	l	10	N. C.
1	m	11	Negative output to coil
2	n	12	Positive output to coil
-	p	13	+ 19 Vdc input
-	r	14	Slotted for polarizing key
3	s	15	Common

Table 2. The EM-A-10 Plug-In Receptacle and Terminal Board Interconnecting Wiring

Portions of the EM-A-10 servo amplifier are of incapsulated construction and must be replaced as complete assemblies. Amplifier A1 and A2 shown on the schematic diagram figure 1 are examples of this type of construction. Replacement of A1 and A2 require factory adjustments to be performed to the resistance values designated by an asterisk (*). Therefore, should replacement of either amplifier be required, it is recommended that installation be accomplished by Vickers. Replacement EM-A-10 amplifiers are available.

D. CIRCUIT DESCRIPTION:

Amplifier Section - The EM-A-10 is a DC amplifier, consisting of a high gain summing preamplifier feeding a unity gain buffer amplifier which drives a power output stage.

The output stage is statically adjusted to produce 200 Milliampere (MA) of current through the 20 Ω servo valve coil, (Vickers type SE3/SF4 servo valve) and varies from this 200 MA value with variations in input signal.

An explanation of the circuitry follows. Refer to the complete schematic diagram figure 1, the pictorial diagram figure 2, and the simplified schematic diagram figure 3.

Command and feedback signals are connected through R1 and R2 to the input of amplifier A1. Resistors R1, R2, and amplifier A1's input resistance form a summing network which permits a difference potential to be developed across amplifier A1's input resistance. The amplitude of this potential is determined by the polarity and amplitude of the input signals, the input coupling resistance R1 and R2, and the input resistance of amplifier A1. Under normal operating conditions, the junction of R1 and R2 is maintained at "virtual ground" within a few millivolts by A1. Diodes D8 and D9 limit amplitude extremes at the input of A1 to approximately ± 5 volt maximum, if the amplifier output saturates. Amplifier A1 inverts the output signal with respect to the input signal, permitting gain adjustment to be obtained by a negative feedback arrangement through resistors R3 and R4. A portion of the inverted output is allowed to develop across the input resistance of amplifier A1. This negative feedback subtracts from the input signal sub-

sequently reducing the gain of the amplifier.

The output of A1 is used to drive amplifier A2 which in turn provides the current necessary to drive power transistor Q5 and Q6. (Shown on the complete schematic diagram figure 1).

Amplifiers A1 and A2 are of the same type. But, amplifier A1's gain differs from that of amplifier A2, due to wiring arrangement. Amplifier A1's gain is essentially the ratio of feedback to input resistance or:

$$\text{A1 Gain - Input 1} = \frac{R3 + \frac{R4 \cdot R4a}{R4 + R4a}}{R1}$$

(Approx. gain of 2)

$$\text{A1 Gain - Input 2} = \frac{R3 + \frac{R4 \cdot R4a}{R4 + R4a}}{R2}$$

(Approx. gain of 20)

Amplifier A2 is connected to provide a non-inverting, unity gain amplifier characteristic. Unity gain amplifiers (gain of 1) provide isolation between circuits (buffer action) and will permit a source with low current capacity (A1) to drive a heavy load (Q5 and Q6).

Transistor Q5 and Q6 develop the necessary output current for the servo coil. Resistors R20 and R20a bias amplifier A2 and establish the 200 MA null current through Q6, D6, the servo valve coil, and resistor R26 (the current sensing resistor).

A voltage is developed across R26 directly proportional to the current through it. This voltage is reduced through voltage divider action by R23 and R21, and is fed to pin two (2) of the unity gain amplifier A2 reducing its gain. This gain reduction (negative feedback) improves the linearity of the driver stage A2 and the output transistor circuit Q5 and Q6. R25a and R25b are adjusted to limit the maximum current. When the voltage across R25a and R25b exceeds the threshold voltage of D4 and D5, the diodes conduct limiting a further current rise in the output circuit.

Dither - The dither signal (60 to 400 Hertz) is connected to pin 1 of the plug-in module. A variable resistive divider network R16 and R18 provide adjustment of the value of dither. This dither is applied to pin two (2) of amplifier A2 through resistor R17. Dither signal is used to keep the servo flapper in constant

motion, thus preventing the flapper from magnetizing in a locked condition against the orifice. Constant motion of the flapper will also reduce the effect of silting (fine particle build-up around the orifice).

Power Supplies - Four regulated power supplies are provided on the plug-in module. Refer to the schematic diagram figure 1. The amplifier section utilizes both a positive ten (+10) and a negative ten (-10) volt supply for operation. A positive ten (+10) and a negative ten (-10) volt supply is also available for external use.

The externally connected supplies may be used for amplifier control circuitry if desired, thus providing the control voltage and amplifiers necessary for a complete system in one plug-in module.

All the regulated supplies operate in a similar manner, therefore, explanation of only one will be presented.

Upon application of negative nineteen (-19) volts DC to pin 3 of the plug-in module, zener diode Z2 conducts through R7 establishing a regulated source voltage for the base of Q2. A portion of this regulated voltage is applied to Q2 through the voltage divider network of R9, D2, and R11. Diode D2 and resistor R11 shunt the base resistance of Q2 and reduce the base drive as the temperature rises. This reduction in drive prevents thermal runaway of transistor Q2. Emitter resistor R13 swamps the emitter base junction resistance and prevents a large increase in emitter current, particularly at low temperatures. Q2 and R13 act as a variable voltage dropping resistor for Zener Diode Z4, and maintain a constant current through Z4 with varying input voltages. The combined action of Q2 and Z4 provide a regulated -10 volt source at pin 8 of the plug-in module.

E. TROUBLE SHOOTING PROCEDURE: Determine if the EM-A-10 module is functional. Refer to the schematic diagram figure 1 and the pictorial diagram figure 2.

NOTE

The EMP-A-11 power supply or its equivalent must be used to perform the following test. Minor wiring changes may be required if an equivalent supply is used.

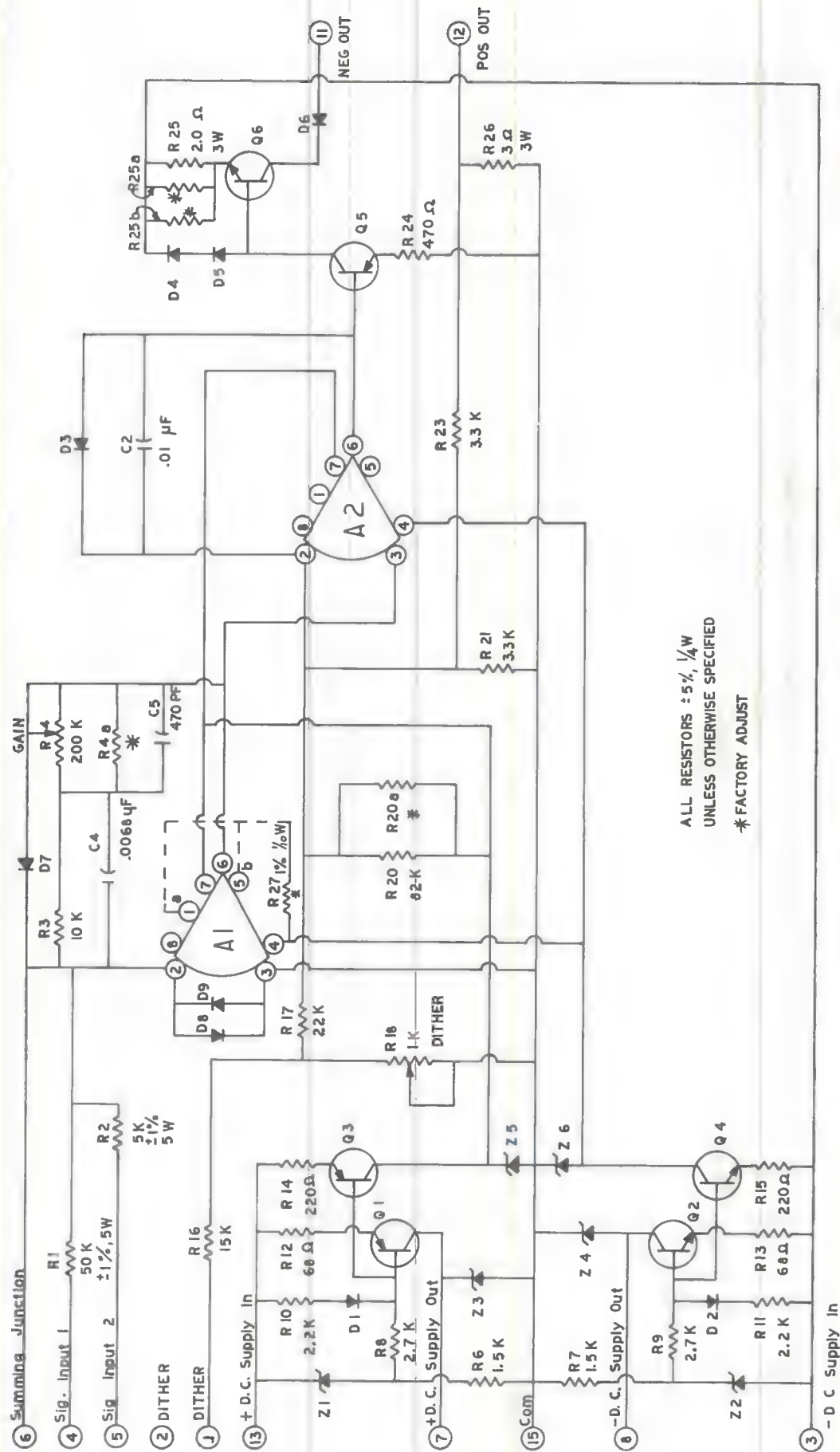
1. Remove electrical power from the system.
2. Remove the input signal connections 4, 5, 6, 7, and 8. Tape the wire ends and symbolize to prevent error.
3. Connect a linear taper, 5000 ohm test potentiometer as shown in figure 4.
4. Remove the EM-A-10 plug-in module. Use the ohmmeter on the low ohm scale to check the resistance of the load as follows:

Connect the ohmmeter between J* - m & n. A reading of approximately 20 ohms is considered normal. If the reading is normal, reinsert the plug-in module and proceed with the test.

NOTE

The characteristics of this amplifier are such that once conduction starts, a very small change in input signal level will cause a very large change in output current. Therefore, the 5000 ohm command test potentiometer (shown in figure 4) will seem to have no effect on the measured output voltage level until the center of the control is reached, then the voltage level will change rapidly from 0 to -1.5 volts. To obtain the -0.6 volts (200 MA) reading, the control must be varied very slowly when the center of the control is reached.

5. Connect a volt-ohmmeter between TB2*-2 and TB2*-3 (common ground reference). Apply power and measure for negative .6 volts (200 MA). The voltage should vary from approximately zero (0) volts at one end of the test potentiometer adjustment range to approximately negative 1.5 volts at the other. If the amplifier performs as indicated, it is operating normally.
6. Remove AC power from the system.
7. Connect symbolized wiring removed in step E. 2.



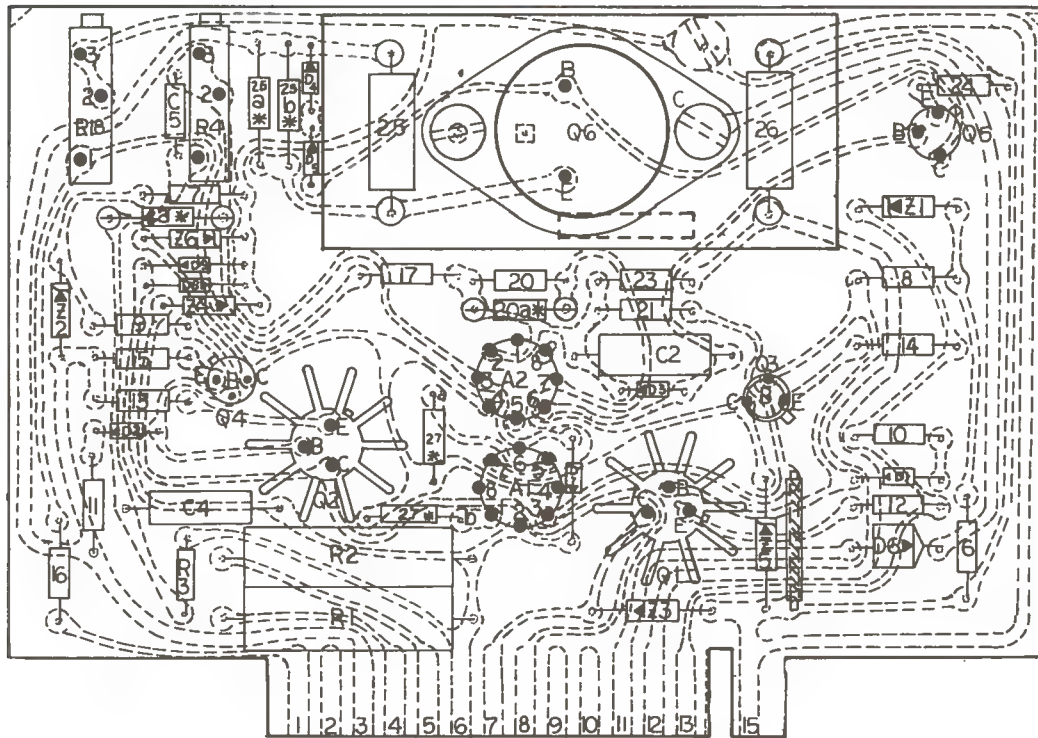


Figure 2. Pictorial Diagram of the EM-A-10

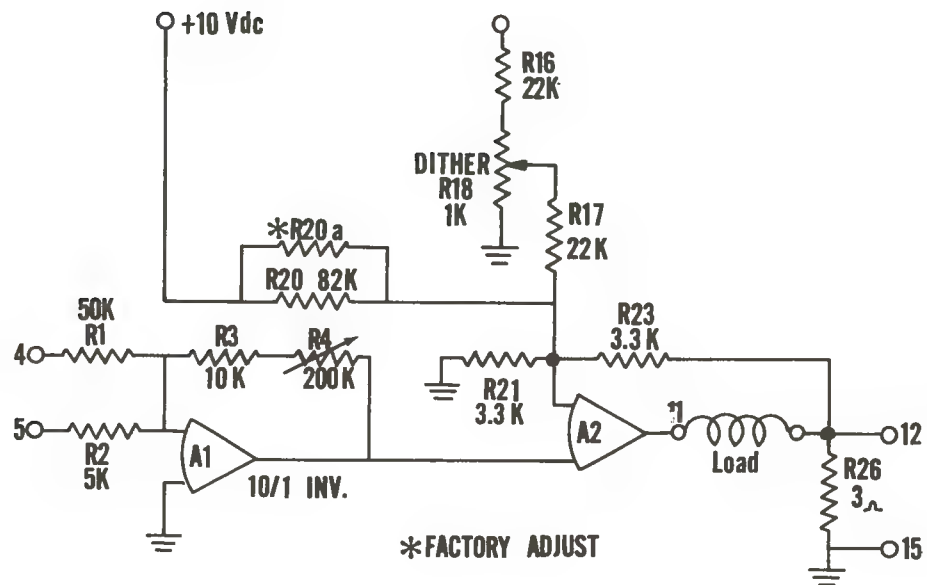
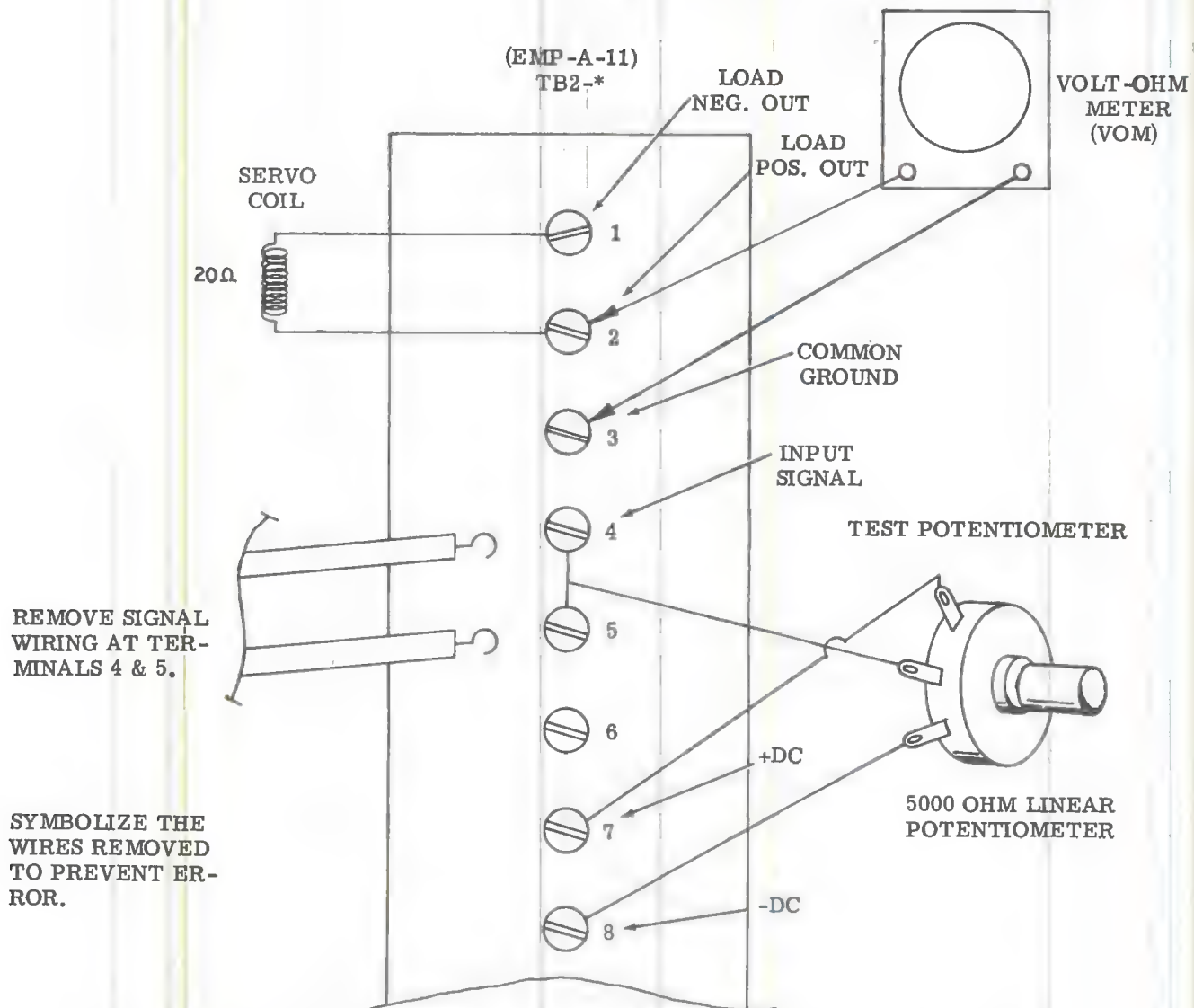


Figure 3. Simplified Schematic Diagram of the EM-A-10



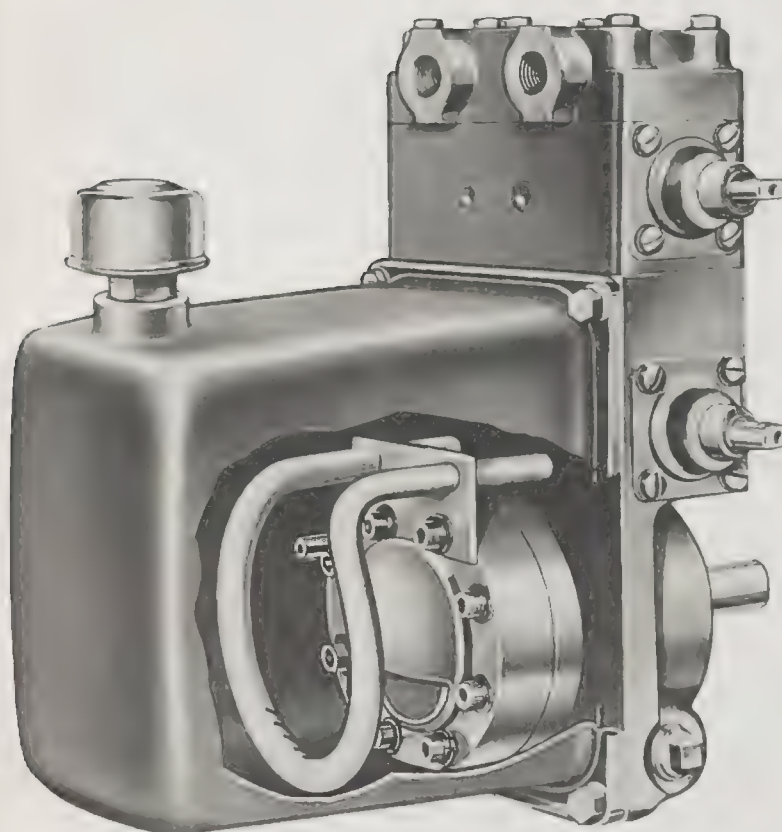
NOTE: IF THE EMP-A-11 POWER SUPPLY IS NOT USED, CONNECT THE POWER SOURCE AS SHOWN TO TEST THE EM-A-11 AMPLIFIER.

Figure 4. Test Potentiometer Wiring Diagram.

Service Parts Information

PK
Series
Power
Packages

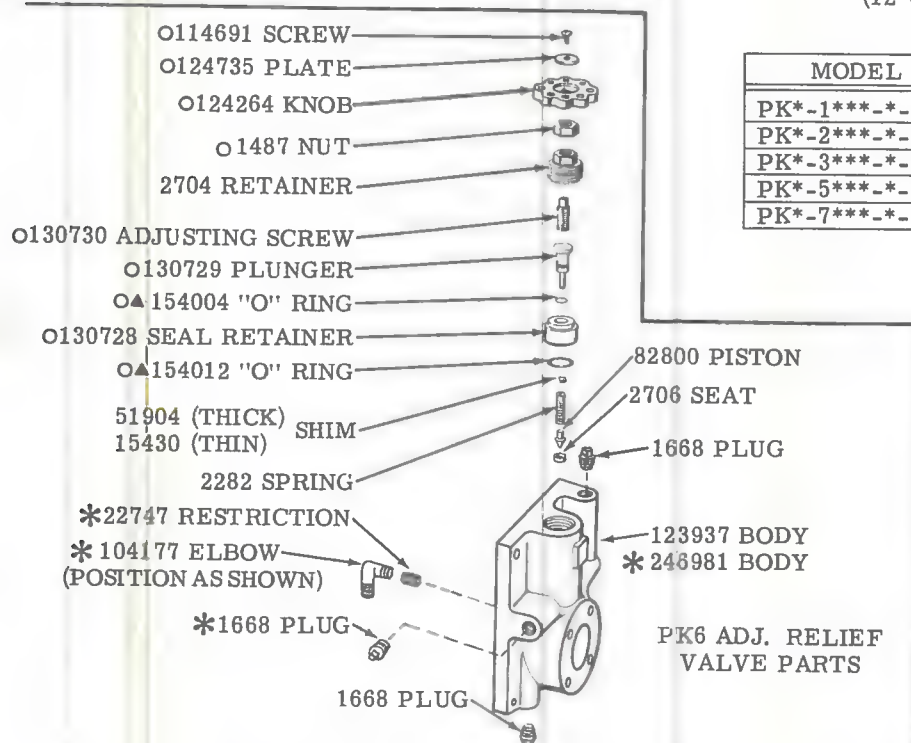
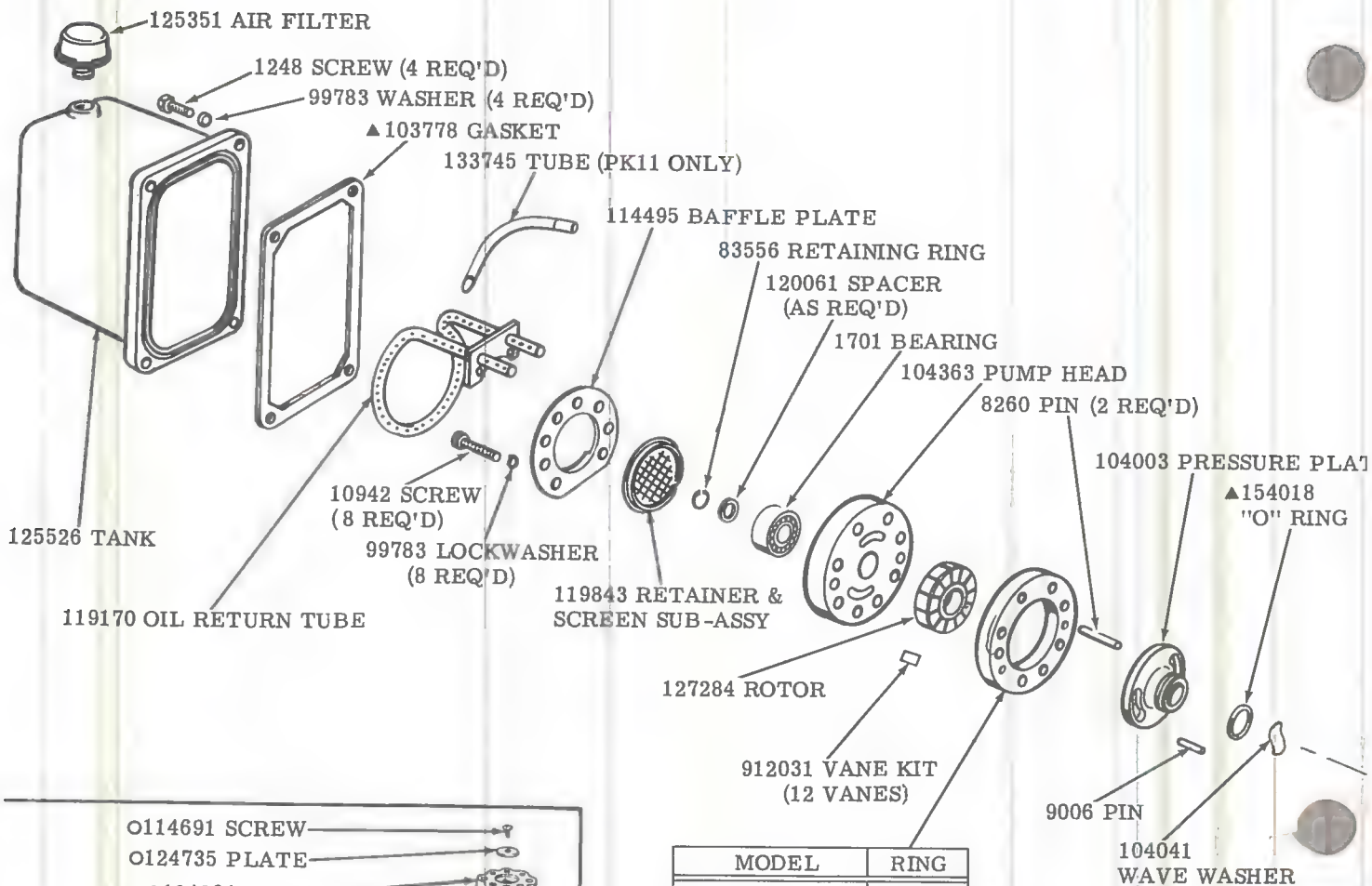
PK1-****-*12
PK6-****-*12
PK11-****-*12



Vickers, Incorporated

P.O. Box 302
Troy, Michigan , 48007-0302

Revised 7-1-89 I-3006-S



MODEL	RING
PK*-1***-***	120713
PK*-2***-***	104165
PK*-3***-***	104166
PK*-5***-***	104018
PK*-7***-***	109999

MODELS	RELIEF VALVE	
	SUFFIX	PRESSURE (P. S. I.)
ALL	A	250
	B	500
	C	750
	D	1000
PK*-2000	E	1250
PK*-5000	F	1500
RELIEF VALVE USED ON PK1		

* NOTE: USE ON ALL PK6 UNITS WITH FLOWS OF 3 - 7 G. P. M.

INCLUDED IN 925306 ADJ. SCREW AND KNOB KIT

TORQUE TO 18-21 lb ft.

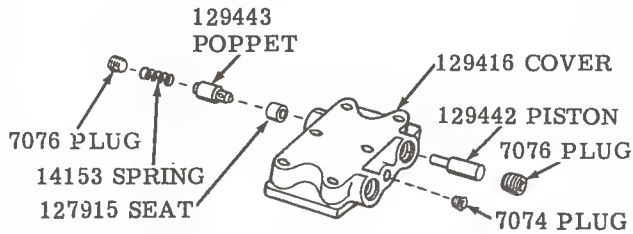
99783 LOCKWASHER (6 REQ'D)

108055 COVER
(PK1 & PK6 MODELS)

TYPE	SCREW	STUD	NUT
BASIC VALVE	1256	—	—
2nd VALVE AUX.	107069	—	—
3rd VALVE AUX.	—	111940	1452
4th VALVE AUX.	—	120680	1452

TORQUE TO
12-15 lb ft.

PK11 LOCK VALVE PARTS



6457 WASHER
(3 REQ'D)

104128 SCREW
(3 REQ'D)

PK11 ONLY

Top valve must
be 127912 spool.
Others as table
below.

▲154008
"O" RING
10348 GASKET
(PK11)

7075 PLUG
(2 REQ'D)

REPLACES
112050 SEAL

109196
RETAINER

▲154011 "O" RING

▲153999 "O" RING

103774 BUSHING

104548 SPRING

103773 BUSHING

101899 SNAP RING

103772 COVER

6457 WASHER (4 REQ'D)

104128 SCREW (4 REQ'D)

109879 BOOT

▲106872 GASKET

108233 VALVE BODY

▲107083
GASKET

98457 PLUG

7076 PLUG

106740 BODY (PK1/11)
SEE INSET AT LOWER
LEFT FOR PK6 BODY

▲473908 SHAFT SEAL

103757 RETAINER

124411 SHAFT

1609 KEY

98574 BEARING

THESE PARTS ARE COMMON
TO ALL DIRECTIONAL VALVES

VALVE	MODEL CODE SYMBOL	TYPE
104040	1	SINGLE ACTING
103771	2	DOUBLE ACTING

▲INCLUDED IN
919167 SEAL KIT

E
PART NUMBER
112360
112361
112362
107314
112363
111946
11 ONLY

MODEL CODE BREAKDOWN

PK * - * * * * - * - 1 2 (L)

1 2 3 4 5 6 7 8 9 10 11

1 Power Pack

2 Series

1 - Long Tank
6 - ADJ. Relief Valve
11 - Lock Valve In Cover

3 Nominal Pump Capacity

4 Basic Valve

0 - None
1 - Single Acting
2 - Double Acting

5 Second Valve

0 - None
1 - Single Acting
2 - Double Acting

6 Third Valve

0 - None
1 - Single Acting
2 - Double Acting

7 Fourth Valve

0 - None
1 - Single Acting
2 - Double Acting

8 Relief Valve
(Working Pressure)

9 Design

10 Modification

11 Rotation
(Optional)
L - Left Hand (CCW Rotation)

For satisfactory service life of these components, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from OFP, OFR, and OFRS filter series are recommended.

Litho in U.S.A.

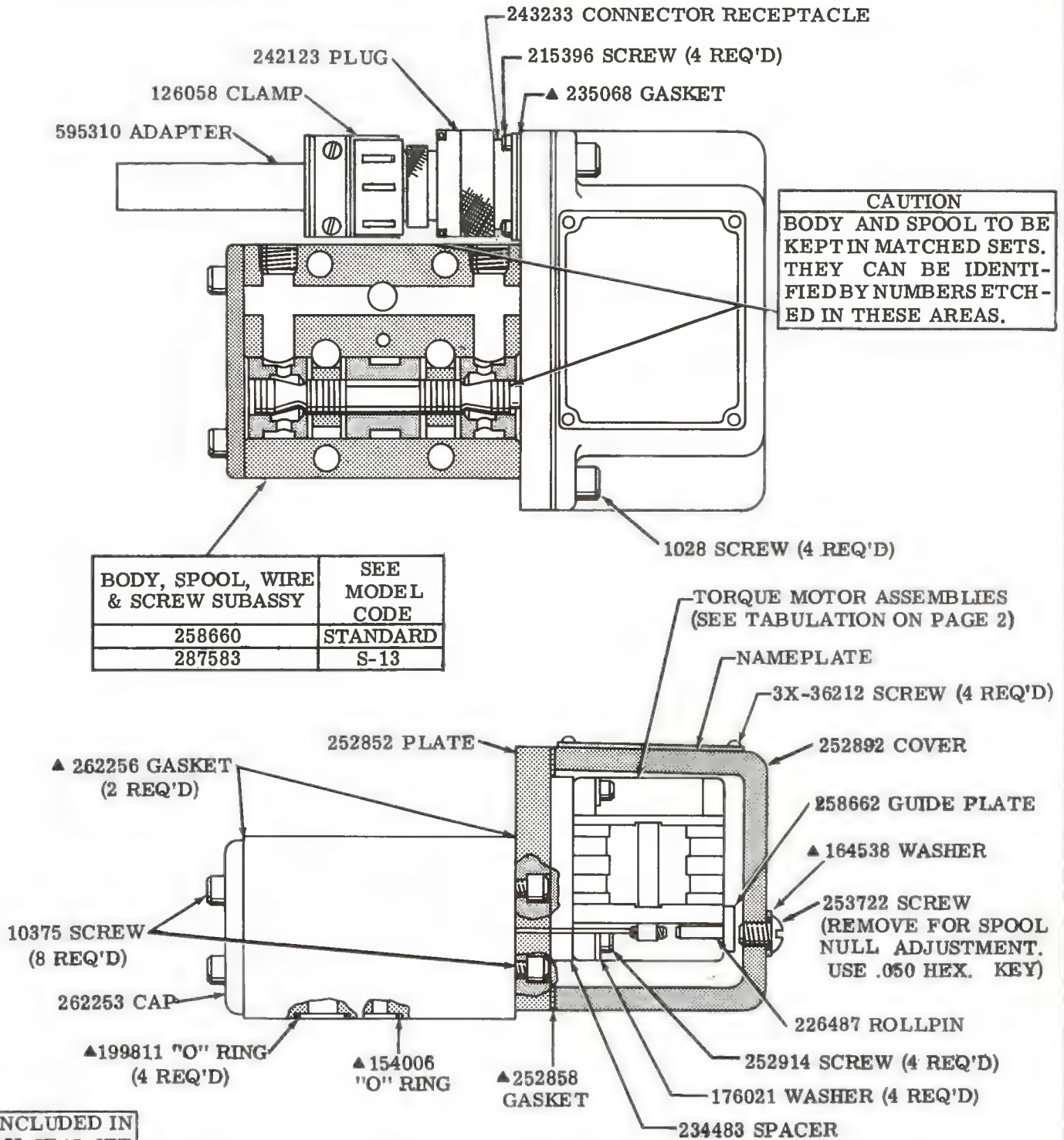
Service Parts Information

VICKERS

ATRIUNOVA COMPANY

**SINGLE
STAGE
SERVO**

SC4-03-*-20(S**)**



Vickers, Incorporated
P.O. Box 302
Troy, Michigan 48007-0302

Revised 3-1-85

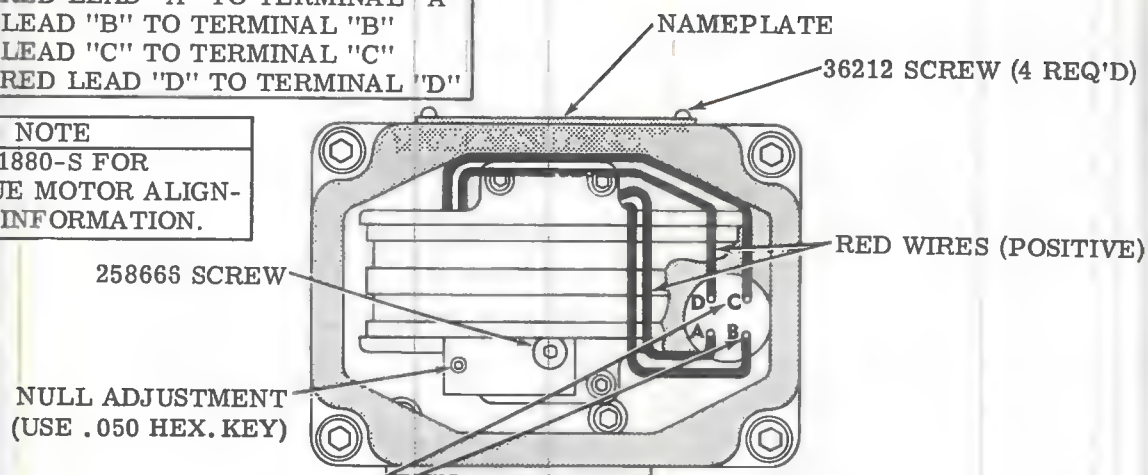
I-3061-S

COIL WIRING PROCEDURE

SOLDER RED LEAD "A" TO TERMINAL "A"
SOLDER LEAD "B" TO TERMINAL "B"
SOLDER LEAD "C" TO TERMINAL "C"
SOLDER RED LEAD "D" TO TERMINAL "D"

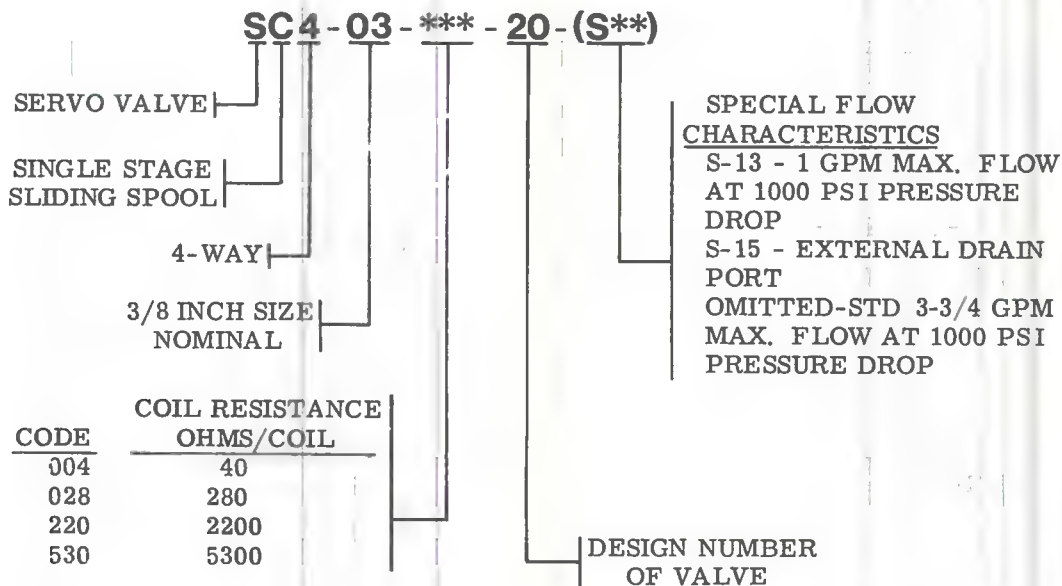
NOTE

SEE I-1880-S FOR
TORQUE MOTOR ALIGN-
MENT INFORMATION.



TORQUE MOTOR ASSY. NO.	WIRE COLORS AT TERMINALS "B" & "C"	NOMINAL CURRENT & RESISTANCE VALUES					
		RESISTANCE OHMS/COIL	DIFF. CONN. (PUSH PULL) MILLI-AMPS	PARALLEL CONNECTED		SERIES CONNECTED	
				RES.	CURR.	RES.	CURR.
212619	YELLOW	40	300	20	300	80	150
207691	WHITE	280	100	140	100	560	50
207692	BLUE	2200	40	1100	40	4400	20
211458	BLACK	5300	25	2650	25	10600	12.5

MODEL CODE BREAKDOWN



To insure sustained efficiency and maximum trouble free life of this precision equipment, initial and continuous full flow filtration of the fluid medium is essential. Select and apply filters from the Vickers OFP, OFR, and OFRS series, which are available in 3, 10, and 25 micrometre filtration ratings.

Litho in U. S. A.

Service Parts Information

**GASKET MOUNTED
ROTARY TYPE
PILOT VALVES**

C2-573 and C2-1573 Series
C3-573 and C3-1573 Series

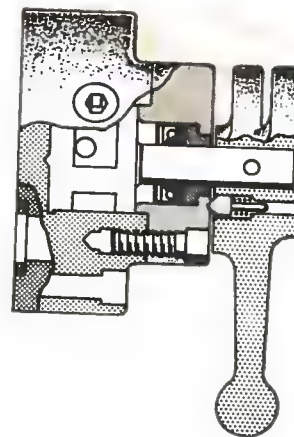
VICKERS
A TRIMONA COMPANY

MODEL	BODY	SPOOL
C2-573-*	104396	45770
C3-573-*	247176	
C2-1573-*	104397	45779
C3-1573-*	261104	

7075 PLUG
(4 REQ'D)

45787
BUSHING

6475 SEAL
2762 GASKET
66945 SEAL
(5 REQ'D)
INCLUDED IN
KIT 919235



45765 COVER

298126 SCREW
(5 REQ'D)

MODEL	PIN	STOP	SPRING	PIN	LEVER
C2-573/1573	—	—	—	—	—
C3-573/1573	—	—	—	—	—
C2-573/1573-A	—	2211	2212	2214	2765
C3-573/1573-A	—			159289	
C2-573/1573-B	2222 (2 REQ'D)			2214	24767
C3-573/1573-B				159289	
C2-573/1573-C				2214	36327
C3-573/1573-C				159289	

For satisfactory service life of these components, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from Vickers OFF, OFR, and OFRS series are recommended.

Vickers, Incorporated
P.O. Box 302
Troy, Michigan 48007-0302

Revised 11-1-85

I-3562-S

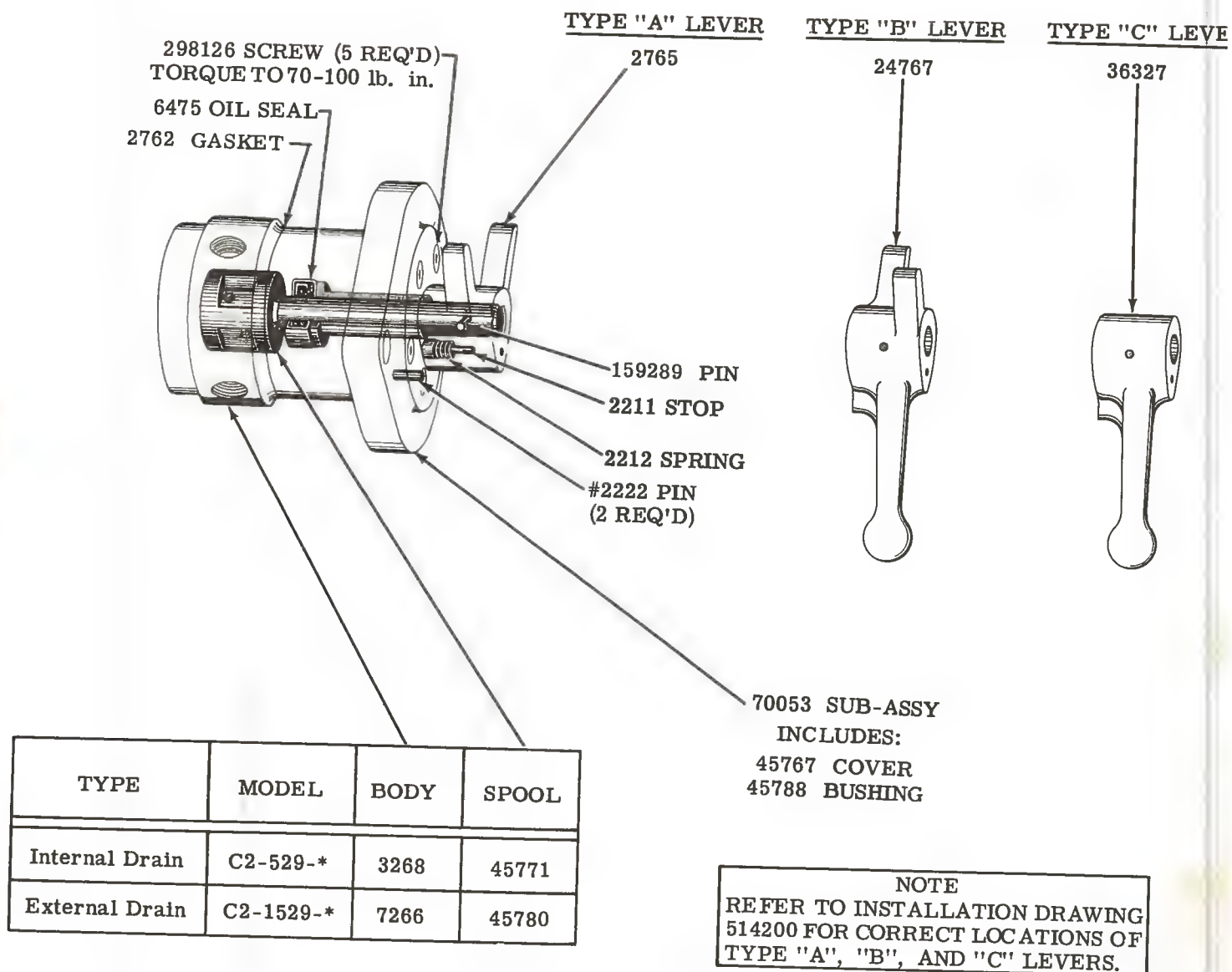


Service Parts Information

ROTARY TYPE PILOT VALVES

C2-529-* Series
C2-1529-* Series

VICKERS®
A TRIMONA COMPANY



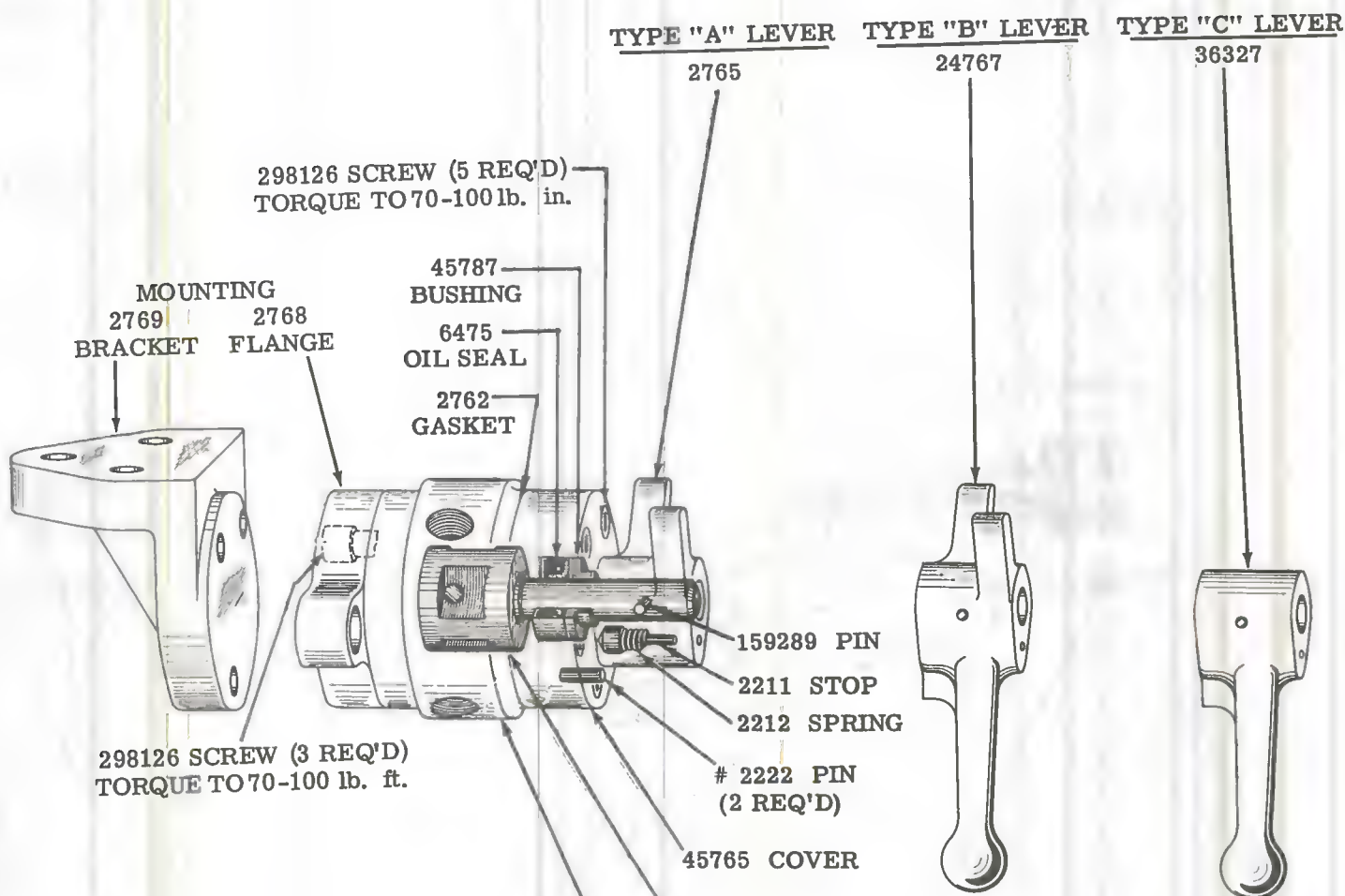
USED ON MODELS WITH TYPE
"B" OR TYPE "C" LEVER ONLY.

WARNING: USE THIS DRAWING FOR PARTS INFORMATION ONLY.

Vickers, Incorporated
P.O. Box 302
Troy, Michigan 48007-0302

Revised 5-1-85

I-3560-S



NOTE
REFER TO INSTALLATION DRAWING
514200 FOR CORRECT LOCATIONS OF
TYPE "A", "B", AND "C" LEVERS.

MODELS WITH INTERNAL DRAIN				BODY	SPOOL	TYPE OF MOUNTING
NO LEVER	TYPE "A" LEVER	TYPE "B" LEVER	TYPE "C" LEVER			
C2-523	C2-523-A	C2-523-B	C2-523-C	3268	45770	FLANGE
C2-524	C2-524-A	C2-524-B	C2-524-C			BRACKET
C2-525	C2-525-A	C2-525-B	C2-525-C			
MODELS WITH EXTERNAL DRAIN				7266	45779	
C2-1523	C2-1523-A	C2-1523-B	C2-1523-C			FLANGE
C2-1524	C2-1524-A	C2-1524-B	C2-1524-C			BRACKET
C2-1525	C2-1525-A	C2-1525-B	C2-1525-C			

USED ON MODELS WITH
TYPE "B" OR TYPE "C"
LEVER ONLY.

For satisfactory service life of these components in industrial applications, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from Vickers OFP, OFR, and OFRS series are recommended.

Litho in U.S.A.

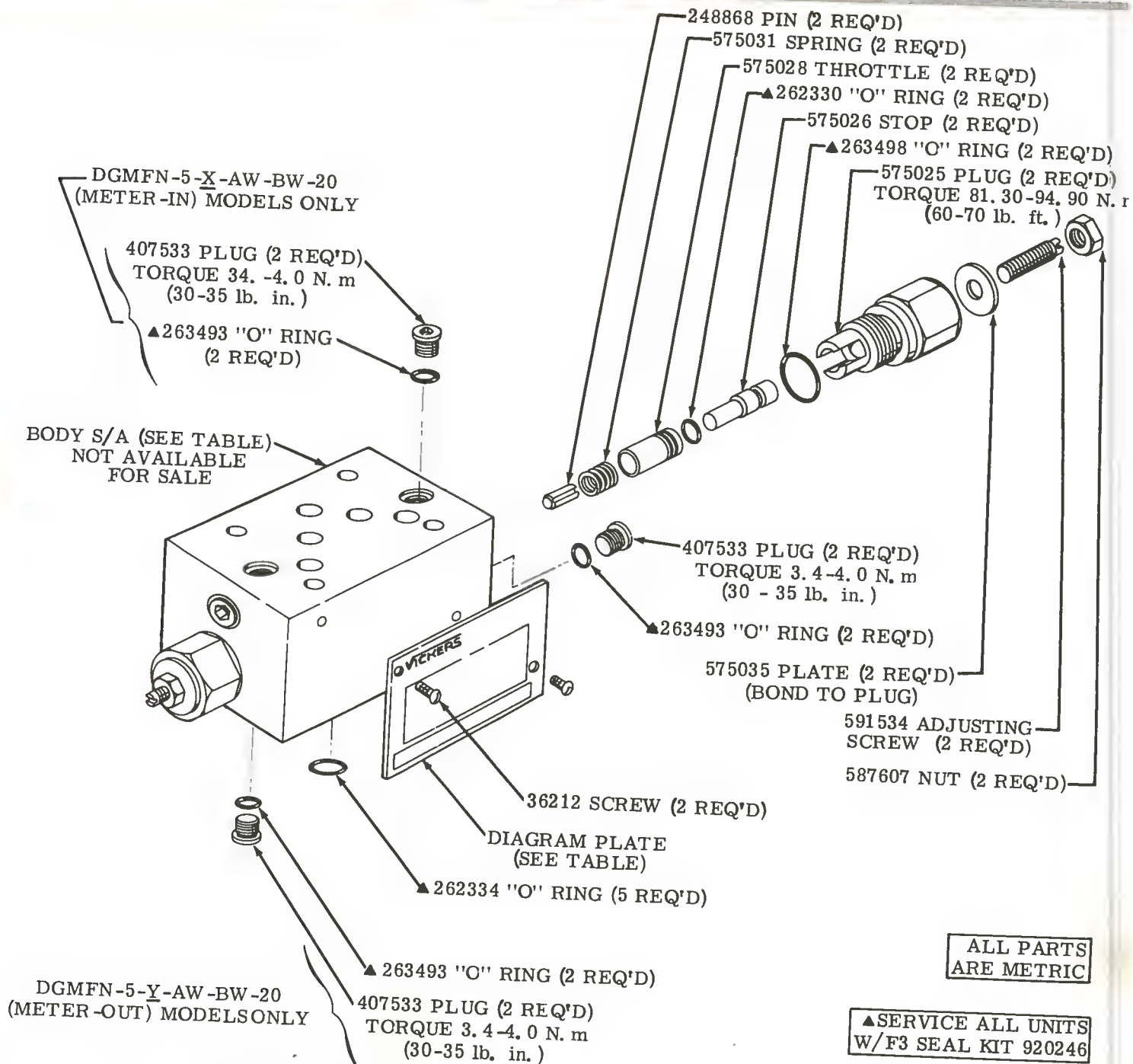
Service Parts Information

**FLOW
CONTROL
MODULE**

DGMFN-5-Y-AW-BW-20

VICKERS®
A TRIMONA COMPANY

DGMFN-5-X-AW-BW-20



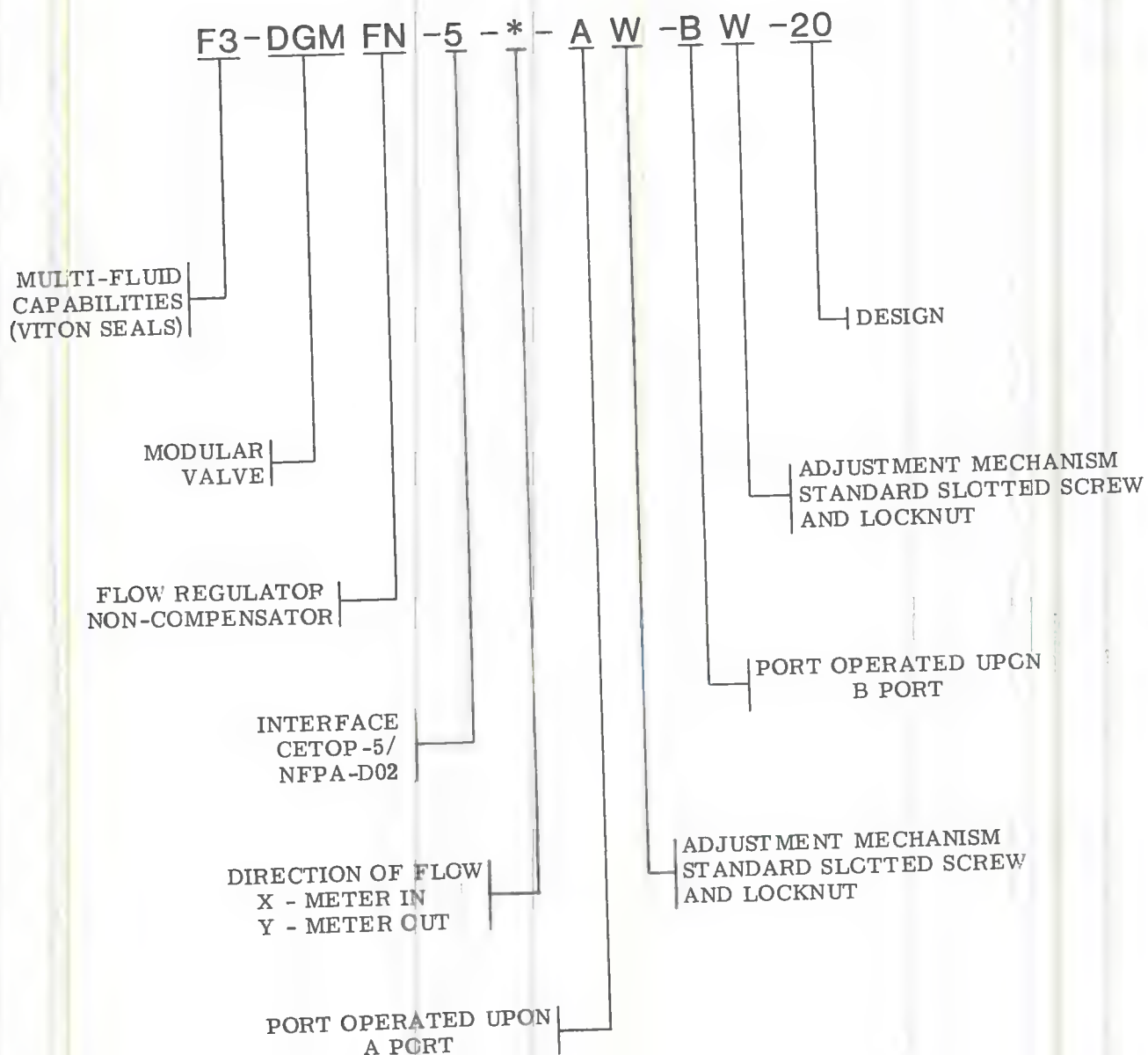
MODEL	BODY S/A	DIAGRAM PLATE
DGMFN-5-X-AW-BW-20	587975	630317
DGMFN-5-Y-AW-BW-20	575039	630318

Vickers, Incorporated
P.O. Box 302
Troy, Michigan 48007-0302

Revised 8-1-86

I-3635-S

MODEL CODE BREAKDOWN



To insure sustained efficiency and maximum trouble free life of this precision equipment, initial and continuous full flow filtration of the fluid medium is essential. Select and apply filters from the Vickers OFP, OFR, and OFRS series, which are available in 3, 10, and 25 micrometre filtration ratings.

Litho in U. S. A.

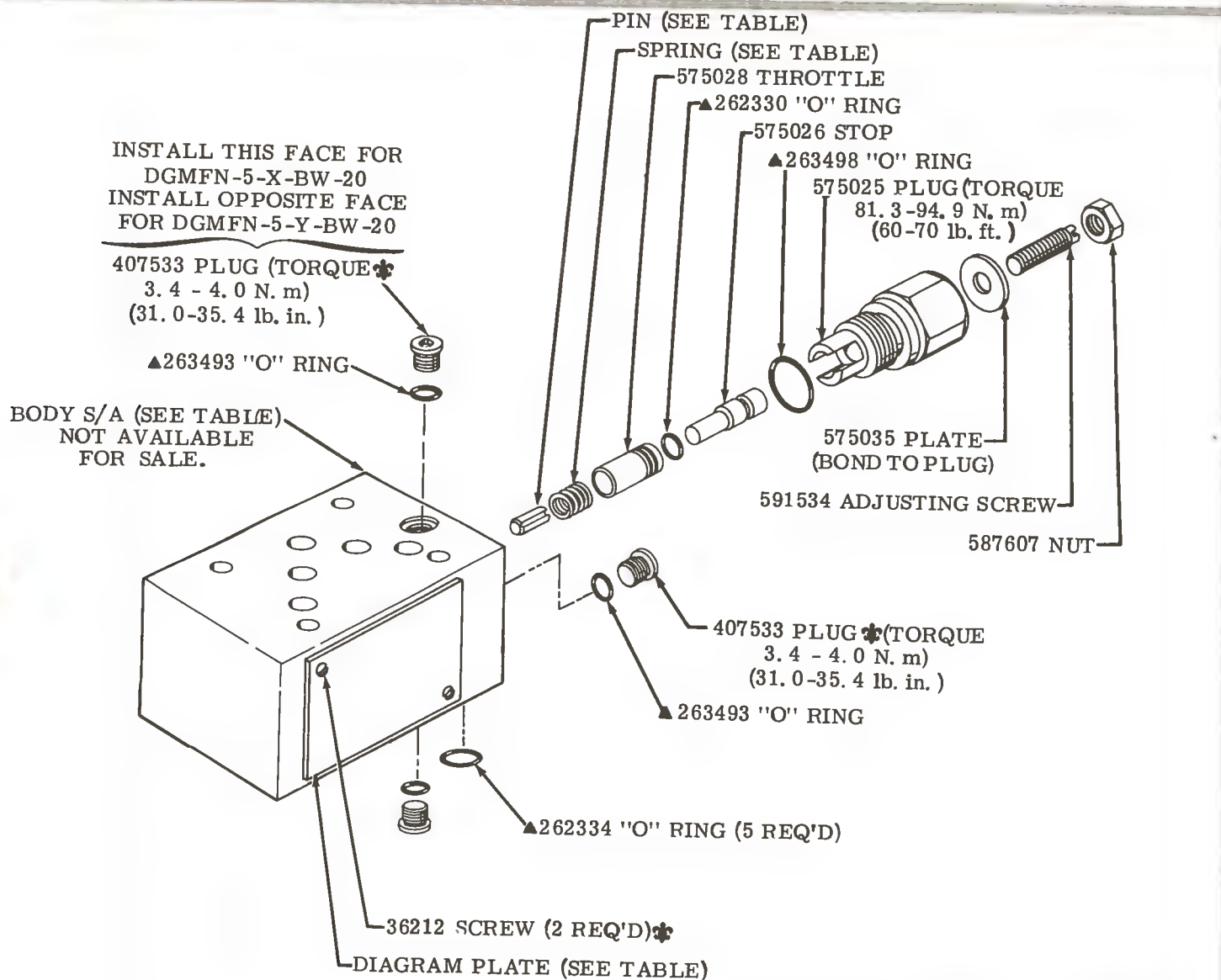
Service Parts Information

**FLOW
CONTROL
MODULE**

DGMFN-5-Y-*W-20

DGMFN-5-X-*W-20

VICKERS
A TRIMOVA COMPANY



▲ INCLUDED IN F3 SEAL KTT 920246
* AVAILABLE ONLY IN KITS OF 25 EACH
ALL PARTS ARE METRIC

NOTE
DGMFN-5-*B*-20 MODEL SHOWN.
-A*- AND -P*- MODELS HAVE THE
PARTS LOCATED AT OPPOSITE END
OF BODY. SEE BACK PAGE FOR
X-A, X-P AND Y-A ASSEMBLY.

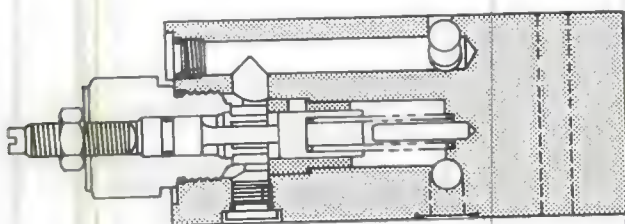
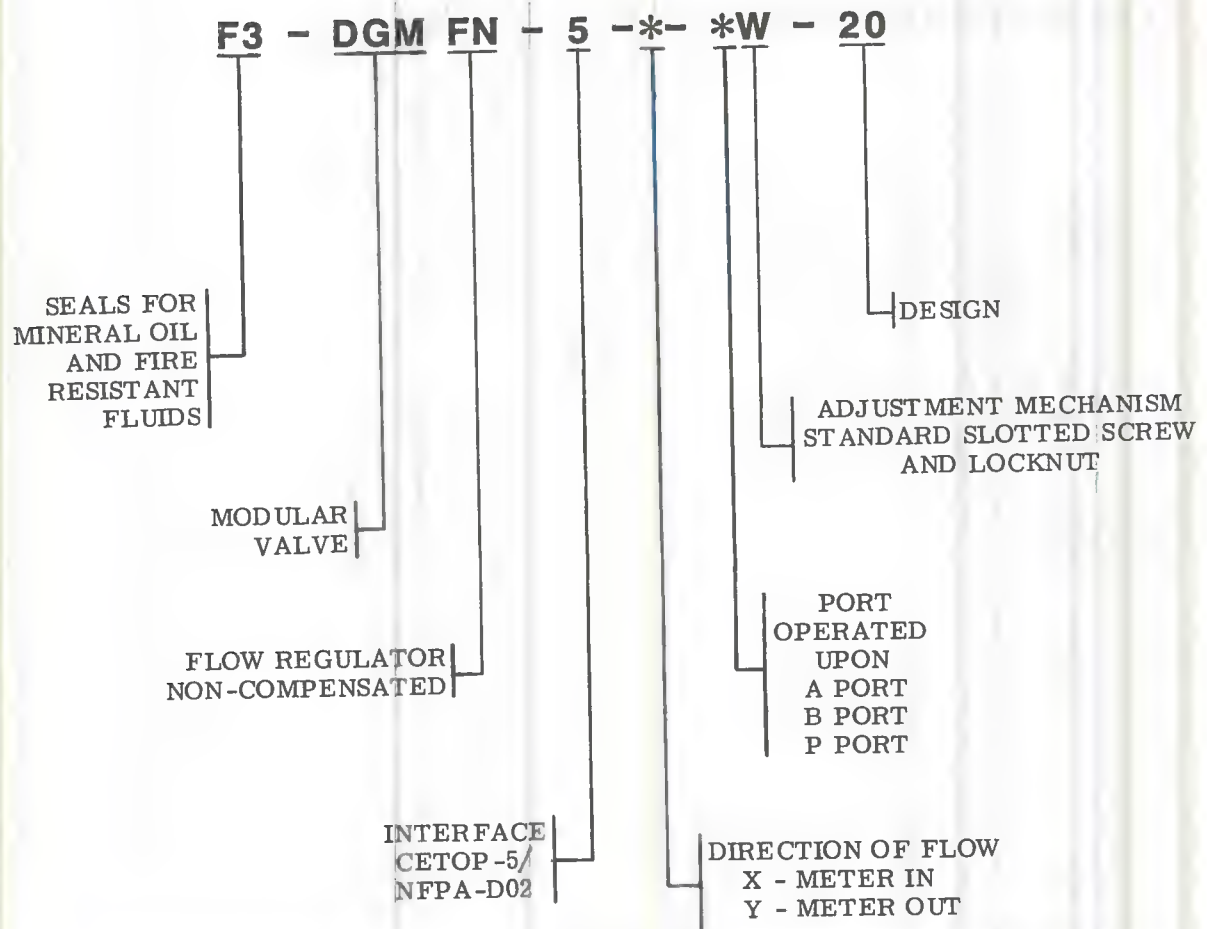
MODEL	BODY S/A	SPRING	DIAGRAM PLATE	PIN
DGMFN-5-X-AW-20	587979	575031	630316	248868
DGMFN-5-X-BW-20	587983		630313	
DGMFN-5-X-PW-20	587985	575032	575034	248874
DGMFN-5-Y-AW-20	587977	575031	630315	248868
DGMFN-5-Y-BW-20	587981		630314	

Vickers, Incorporated
P.O. Box 302
Troy, Michigan 48007-0302

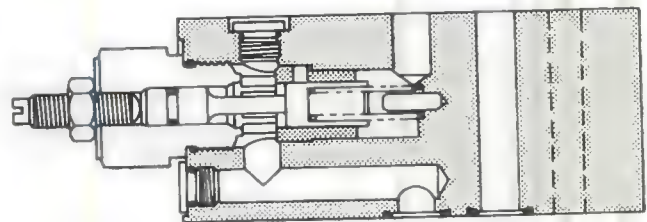
REVISED 4-1-86

I-3634-S

MODEL CODE BREAKDOWN



DGMFN-5-X-PW-20
DGMFN-5-Y-AW-20



DGMFN-5-X-AW-20

For satisfactory service life of these components in industrial applications, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from Vickers OFP, OFR, and OFRS series are recommended.

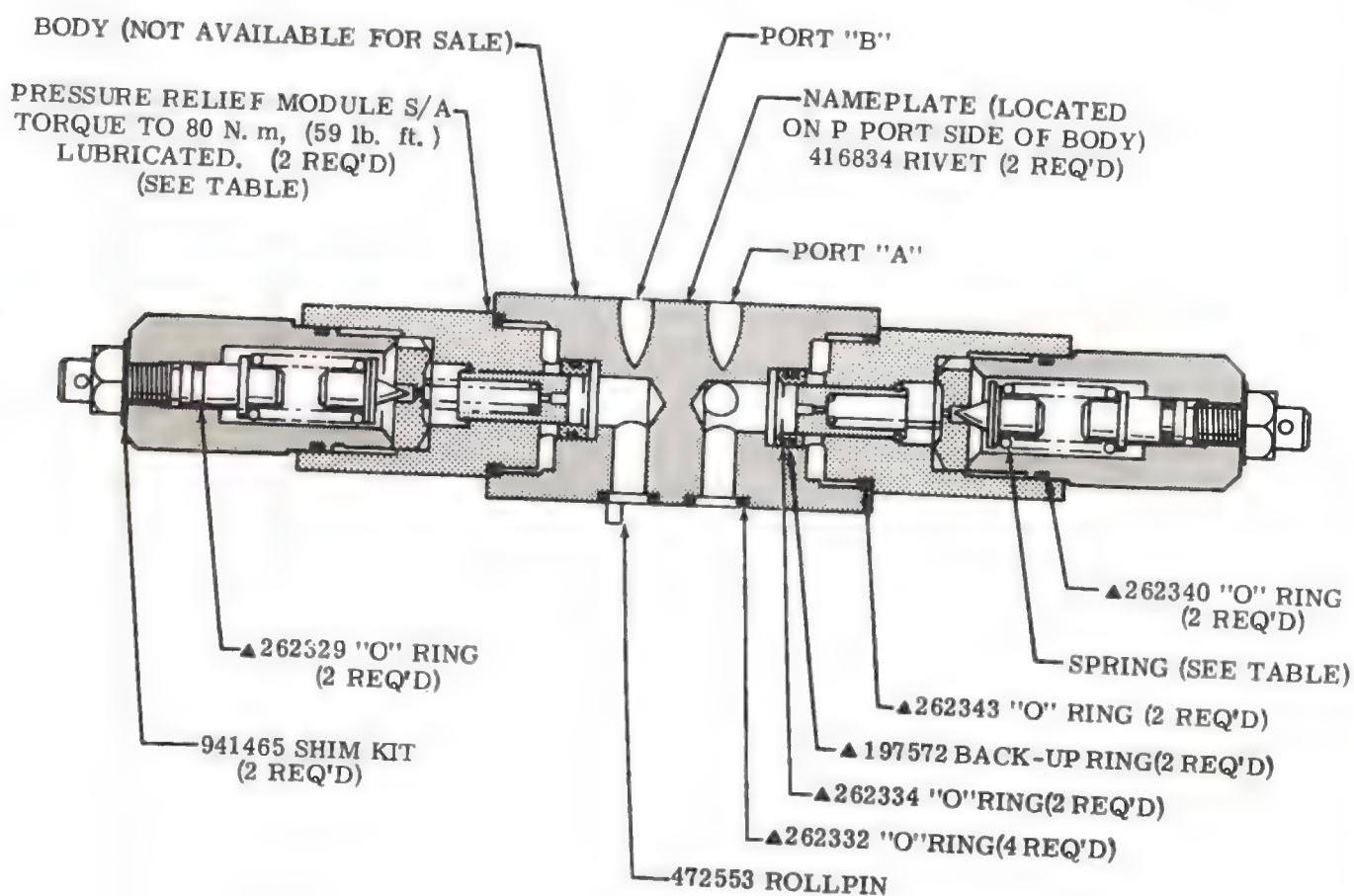
Service Parts Information

PRESSURE RELIEF MODULE

DGMC2-3-AB-*W-BA-*W-31

VICKERS®
A TRIMONA COMPANY

MODEL	SPRING	PRESSURE RELIEF MODULE S/A	PRESSURE RANGE	
			(bar)	(PSI)
DGMC2-3-AB-BW-BA-BW-31	531671	531928	10-70	145-1000
DGMC2-3-AB-CW-BA-CW-31	531672	531529	30-140	435-2000
DGMC2-3-AB-FW-BA-FW-31	531673	531930	50-250	725-3600



▲INCLUDED IN F3
SEAL KIT 920252

MODEL CODE BREAKDOWN

DGM C2 -3- A B - * W -B A - * W -31

1 2 3 4 5 6 7 8 9 10 11 12

1 Modular Valves

2 Type of Module
Service Line Relief

3 Interface
CETOP 3
NFPA-D-01

4 Port Operated Upon
A Port

5 Port Drained To
B Port

6 Pressure Controls
Adjustment Range bars (PSIG)
B - 10 to 70 (145-1000)
C - 30 to 140 (435-2000)
F - 50 to 250 (725-3600)

7 Adjustment Mechanism
Standard Wrench Adj.

8 Port Operated Upon
B Port

9 Port Drained To
A Port

10 Pressure Controls
Adjustment Range bars (PSIG)
B - 10 to 70 (145-1000)
C - 30 to 140 (435-2000)
F - 50 to 250 (725-3600)

11 Adjustment Mechanism
Standard Wrench Adj.

12 Design

For satisfactory service life of these components, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from Vickers OFF, OFR and OFRS filter series are recommended.

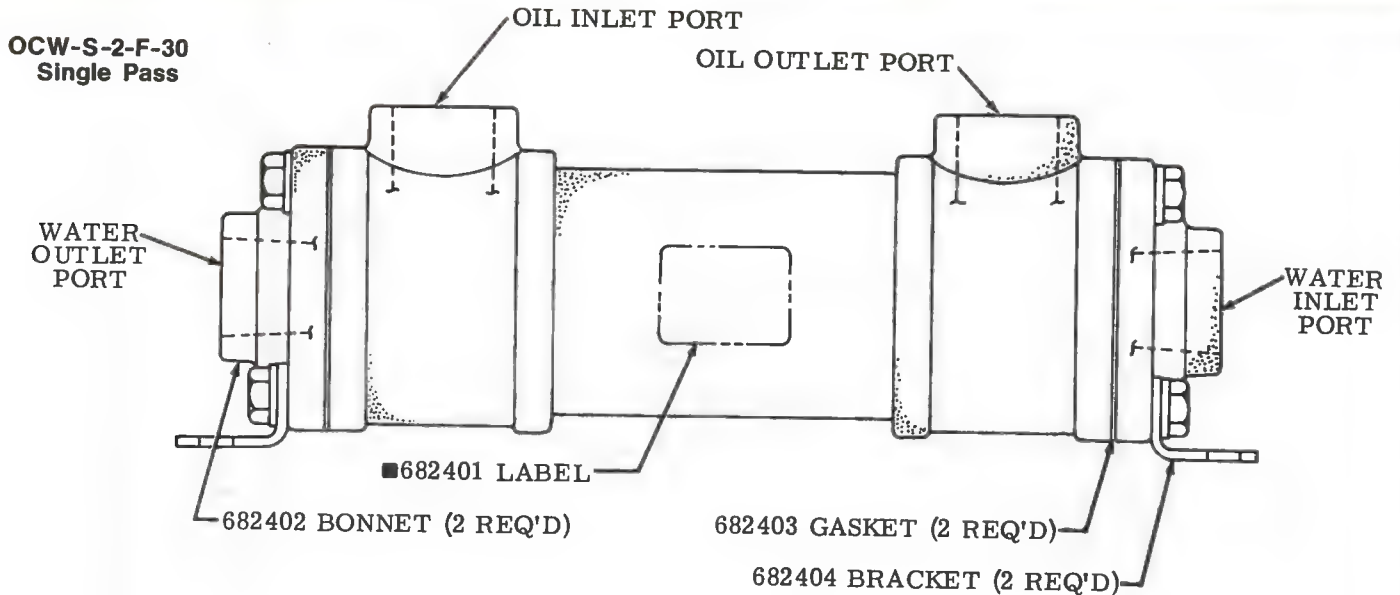
Litho in U.S.A.

Service Parts Information

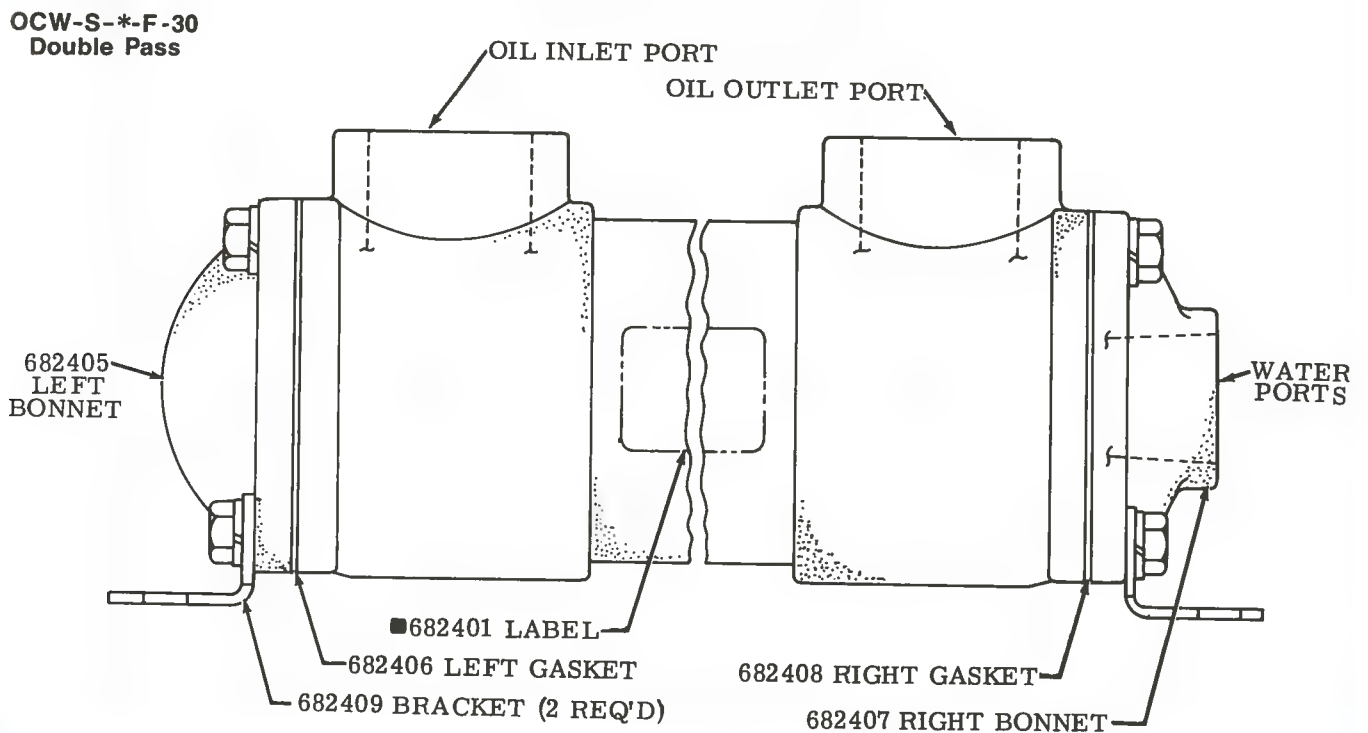
WATER OIL COOLERS

OCW-*-*-*-30

VICKERS
A TRIMONA COMPANY



■ NOT AVAILABLE FOR SALE

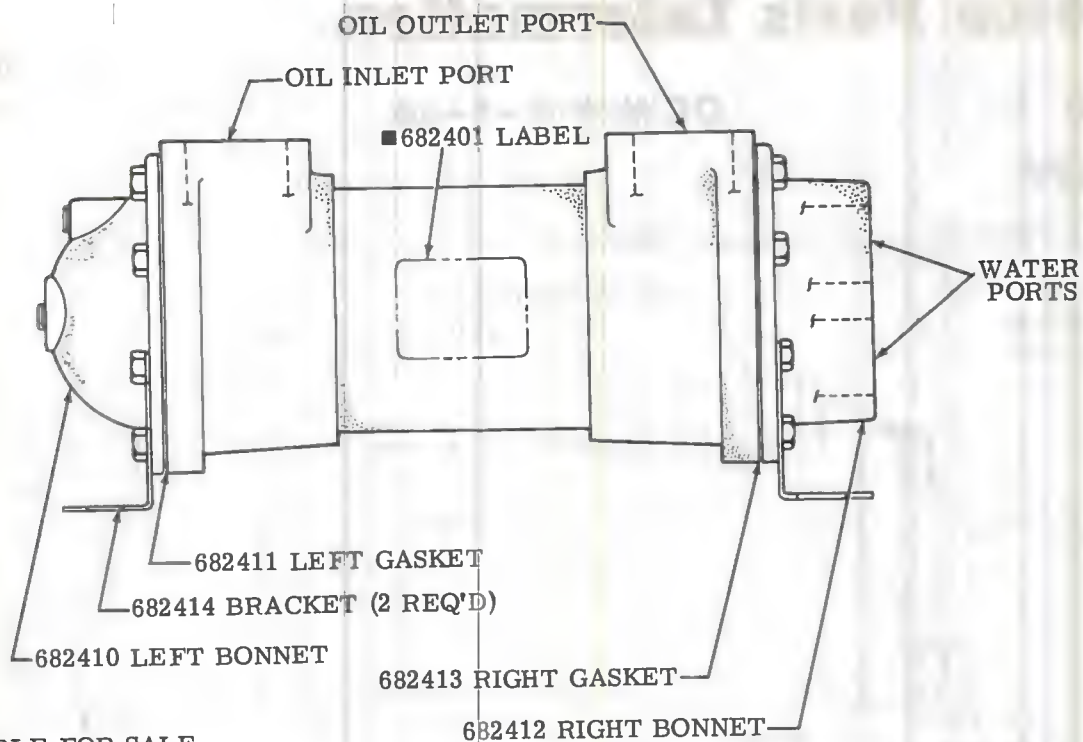


■ NOT AVAILABLE FOR SALE

Vickers, Incorporated
P.O. Box 302
Troy, Michigan 48007-0302

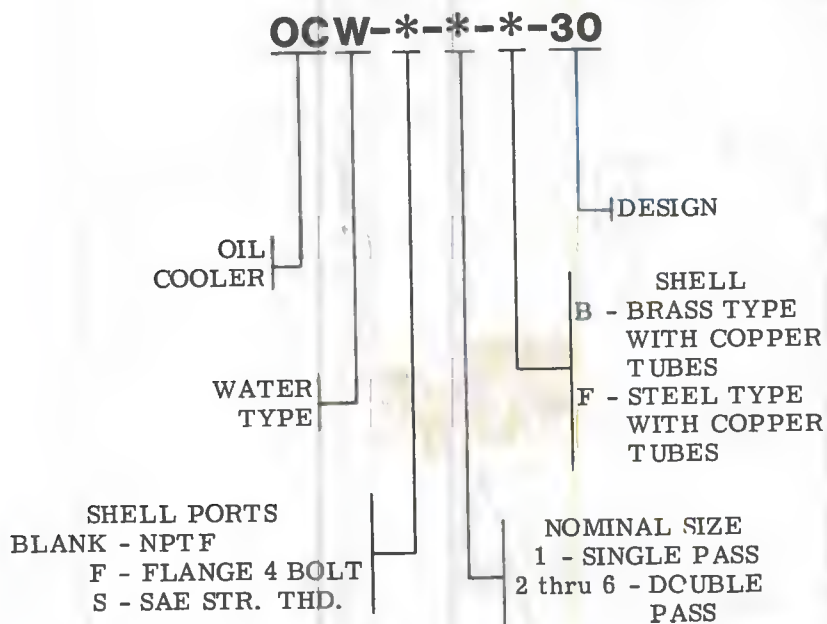
RELEASED 4-1-85

I-3974-S



■ NCT AVAILABLE FOR SALE

MODEL CODE BREAKDOWN

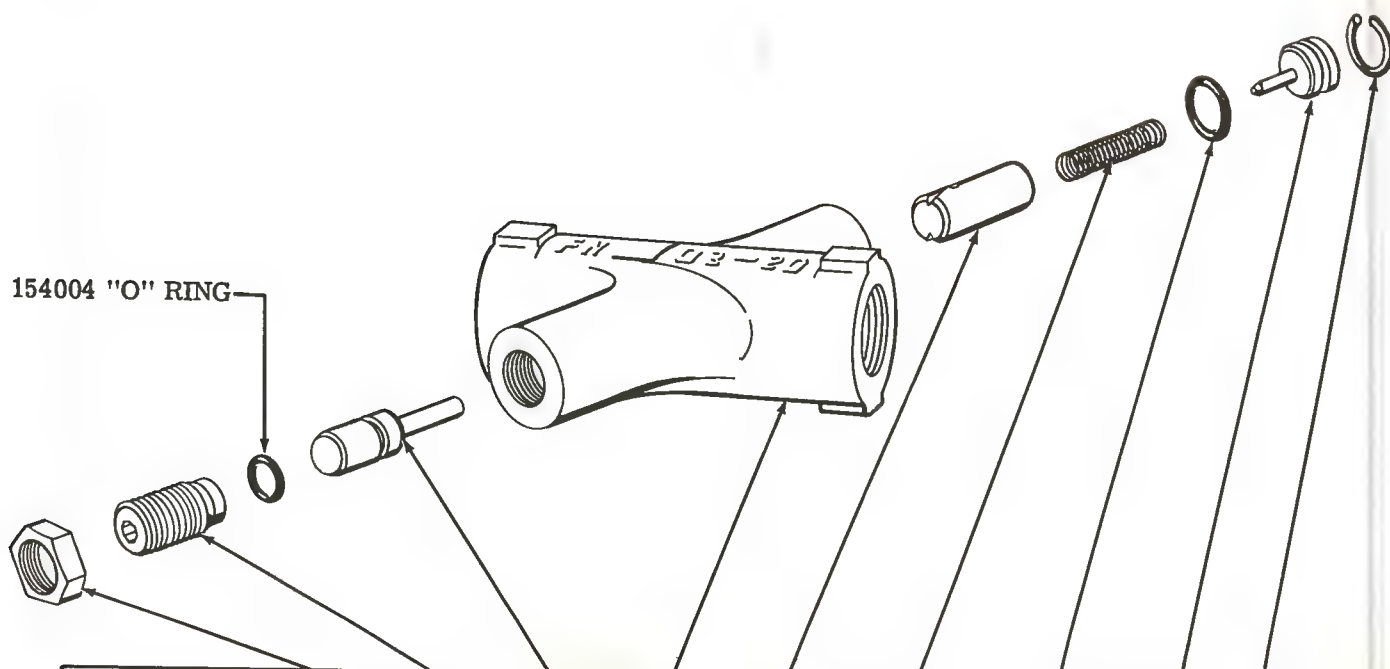


Service Parts Information

NON-COMPENSATED
FLOW REGULATORS

FN-**-1*
FN-(*)*S-**-1*
FN-**-2*
FN-(*)*S-**-2*

VICKERS
A TRIMONA COMPANY



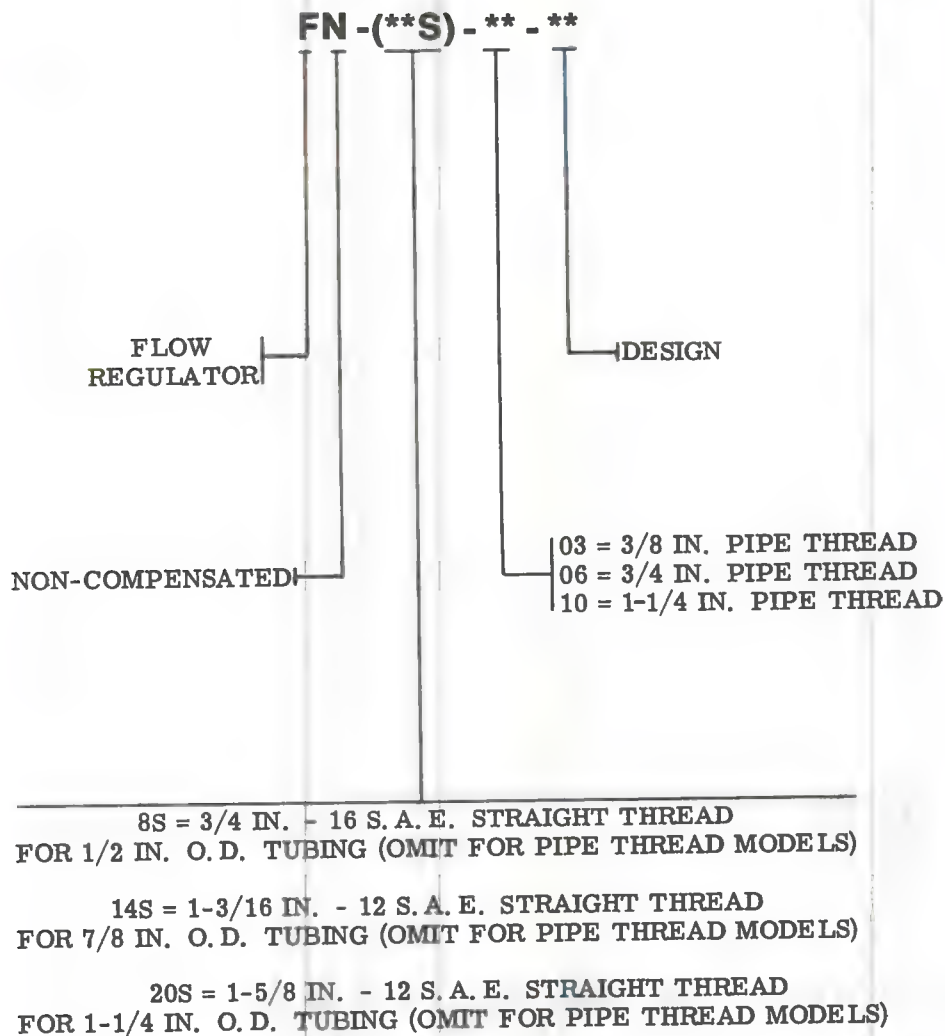
MODEL	NUT	SCREW	STOP	BODY	CHECK VALVE	SPRING	"O" RING	PLUG	SNAP RING
FN-03-10	187012	245454	226287	230128	226288	241339	154005	226289	233227
FN-8S-03-10				230129					
FN-06-10				230410					
FN-14S-06-10				230411					
FN-10-10	166886	253317	253369	292759	292761	292502	154009	292762	313830
FN-10-11				382311					
FN-20S-10-10				292760					
FN-20S-10-11				387112					
FN-03-20	166886	253317	253369	253365	226288	241339	154005	226289	233227
FN-8S-03-20				253366					
FN-06-20				253367					
FN-06-21				387118					
FN-12S-06-21				387117					
FN-14S-06-20				253368					

Vickers, Incorporated
P.O. Box 302
Troy, Michigan 48007-0302

Revised 9-1-85

I-1874-S

MODEL CODE BREAKDOWN



For satisfactory service life of these components, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from Vickers OFP, OFR, and OFRS series are recommended.

Litho in U. S. A.

VICKERS®
A TRIMMOVA COMPANY

Service Parts Information

Hydraulic
Remote
Control

HRC-D-**-**-**-**-10



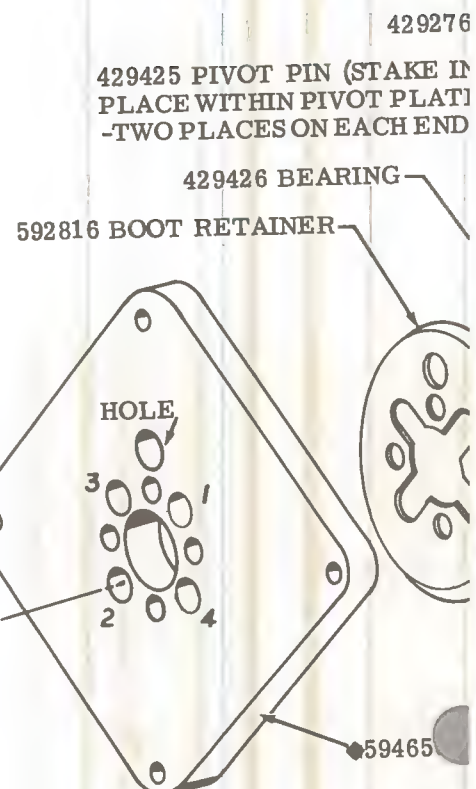
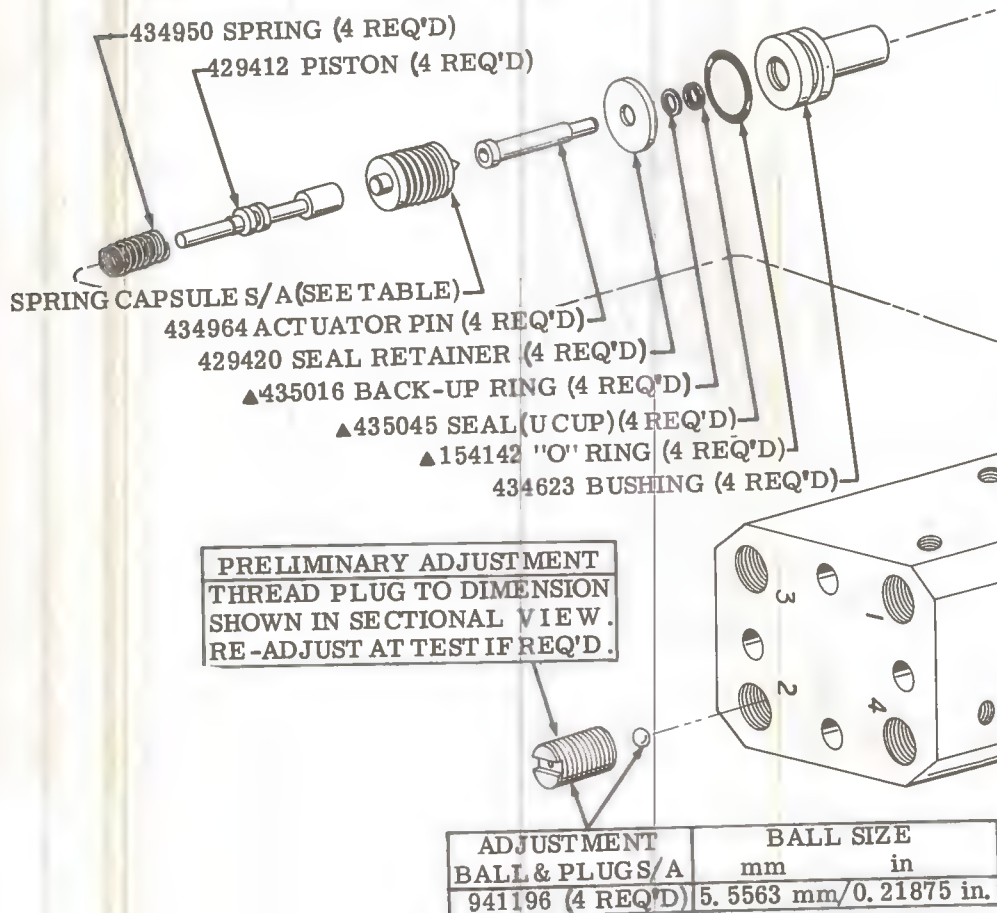
Vickers, Incorporated

P.O. Box 302
Troy, Michigan 48007-0302

Revised 12-1-87

M-2441-S

OUTLET PRESSURE CHARACTERISTIC	SEE MODEL CODE	SPRING CAPSULE SUBASSY	PRESSURE IN bar/PSIG	
			INITIAL	FINAL
Proportional	AA	433705	3.4/49.3	17/246.5
	AB	581351	3.4/49.3	22/319
	AC	573378	6/87	20/290
	AD	585922	3.4/49.3	24/348
	AE	582769	9/130.5	17/246.5
	AF	592078	3.4/49.3	16/232
	AH	432906	5/72.5	15/217.5
	AK	593369	3.4/49.3	15/217.5
	AO	432918	3.4/49.3	14/203
	AP	592083	3.4/49.3	21/304.5
	AQ	592084	3.4/49.3	28/406
	AR	592086	6/87	16/232
	AS	593370	1/14.5	11/159.5
	AT	593371	5.2/75.4	8.3/120.35
	AU	593375	5/72.5	17.5/253.75
	AV	593377	5.4/78.3	16/232
	AW	594234	5.2/75.4	21/304.5
	AZ	595542	13/188.5	24/348
	EB	583045	10/145	21/304.5
	EC	588900	0/0	11/159.5
Proportional with forced rise to supply pressure	BA	485664	0/0	20/290
	BB	435665	2/29	11/159.5
	BC	573353	5/72.5	22/319
	BD	575728	6/87	20/290
	BF	593379	5/72.5	20/290
	BG	435666	2/29	19/275.5
	BH	594659	9/130.5	20/290
	BJ	594655	0/0	14/203
Proportional with gain	CA	435667	1/14.5	11/159.5
	CB	589476	3/43.5	30/435
Proportional with gain change & forced rise to supply press.	DA	586095	4/58	23/333.5
	DB	589484	3/43.5	15.5/224.75

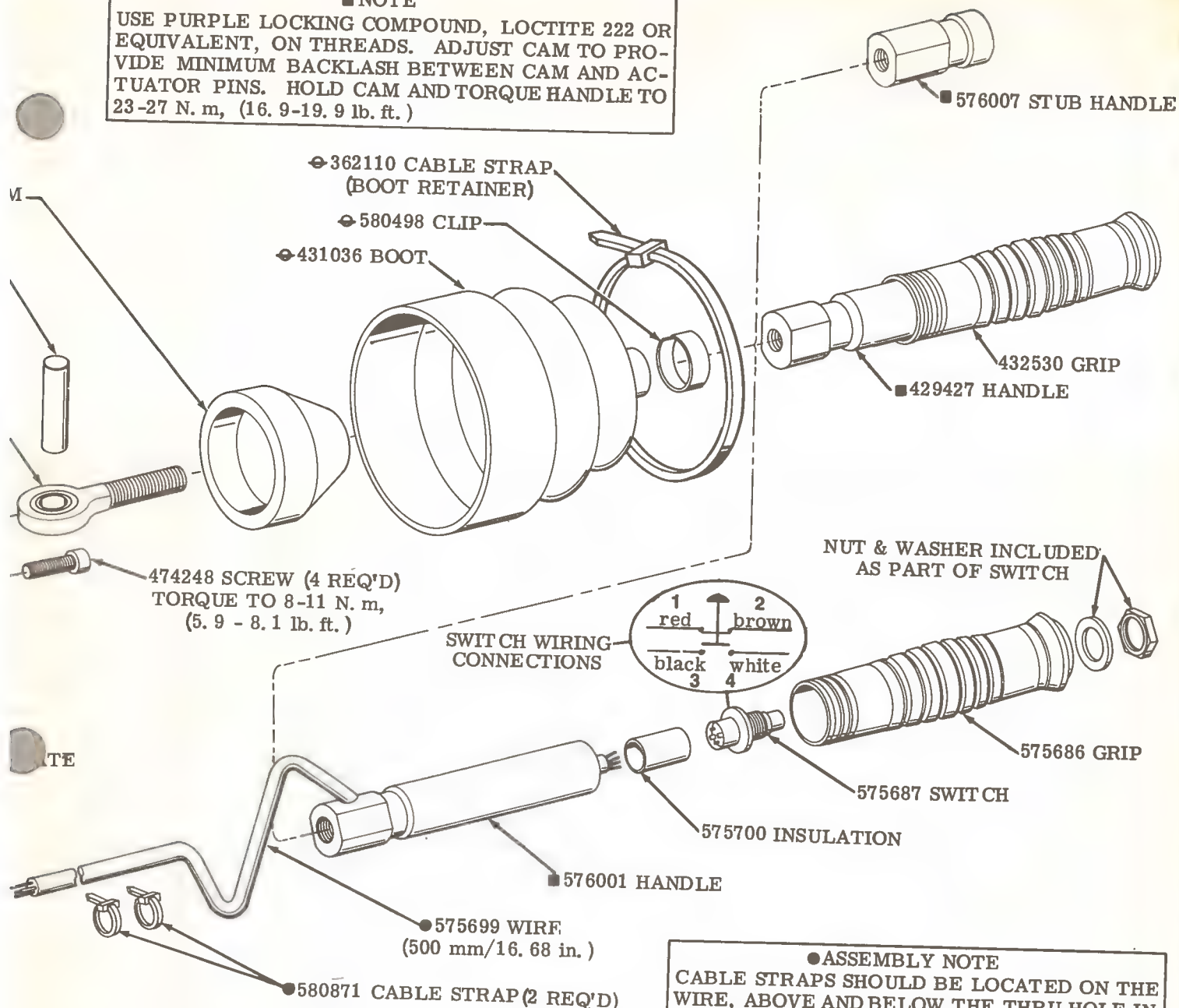


NOT
GRE
FOR

B

■ NOTE

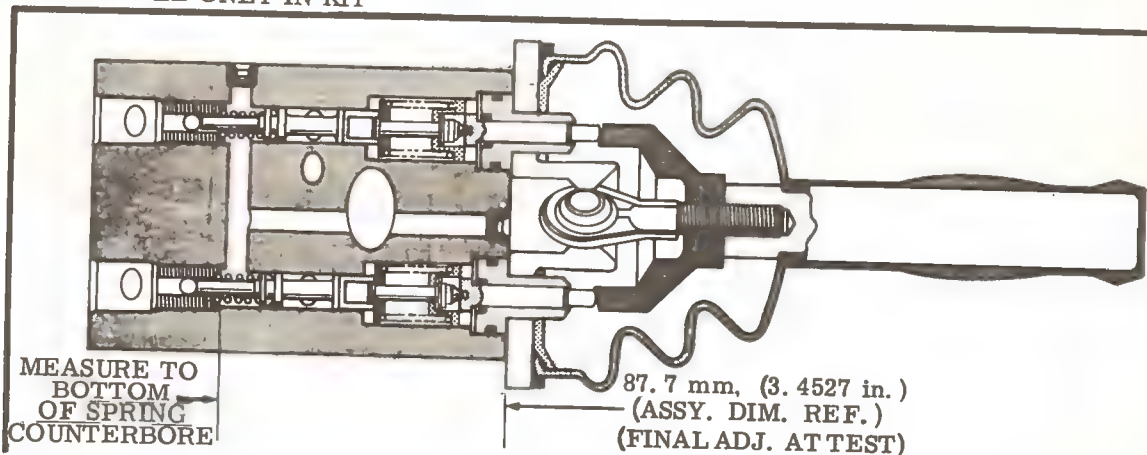
USE PURPLE LOCKING COMPOUND, LOCTITE 222 OR EQUIVALENT, ON THREADS. ADJUST CAM TO PROVIDE MINIMUM BACKLASH BETWEEN CAM AND ACTUATOR PINS. HOLD CAM AND TORQUE HANDLE TO 23-27 N. m, (16.9-19.9 lb. ft.)



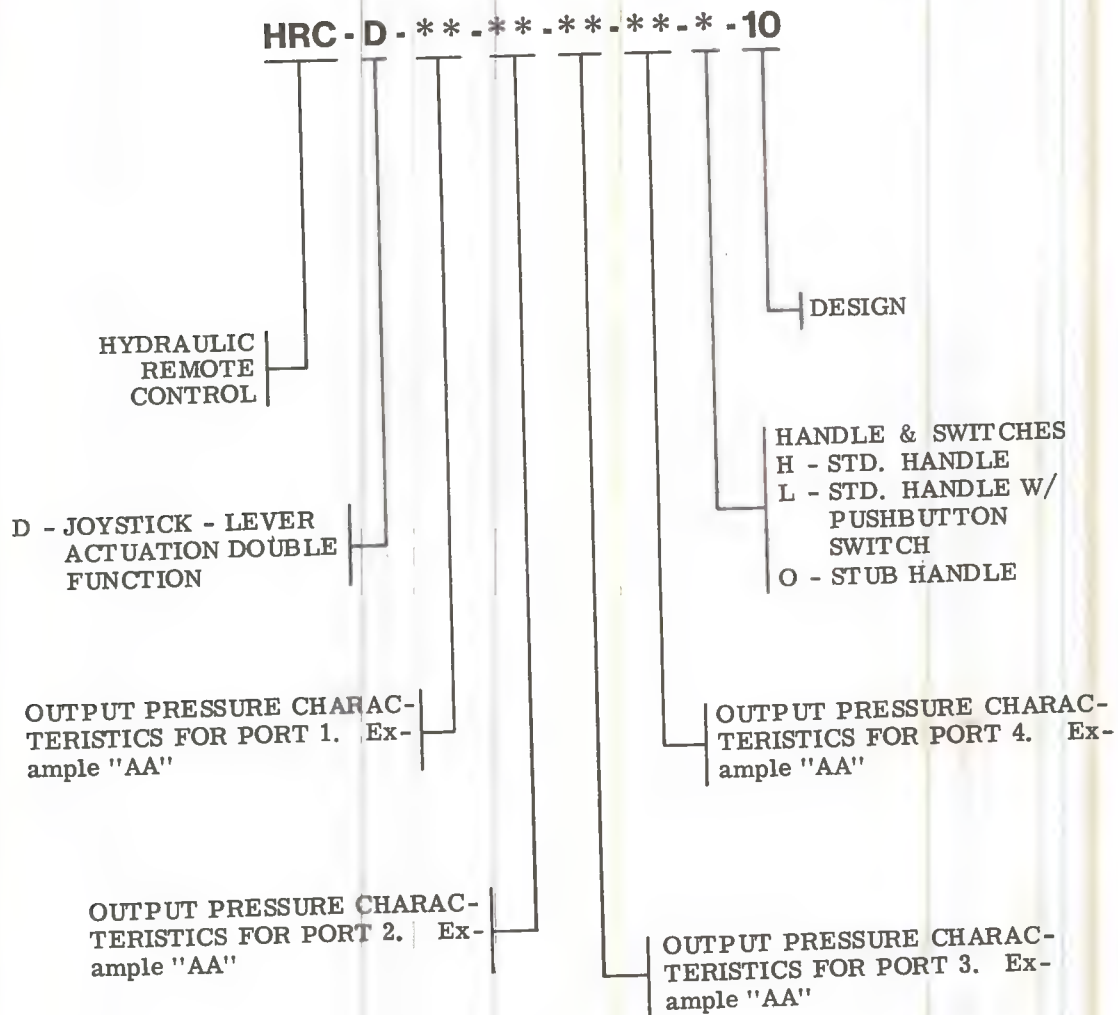
LY LIGHT COAT OF THIS SURFACE BE- OF PIVOT PLATE.

- ▲ INCLUDED IN SEAL KIT 920179
- ◆ INCLUDED IN BOOT KIT 941388
- ◆ NOT AVAILABLE FOR SALE
- ◆ AVAILABLE ONLY IN KIT

● ASSEMBLY NOTE
CABLE STRAPS SHOULD BE LOCATED ON THE WIRE, ABOVE AND BELOW THE THRU HOLE IN THE PIVOT PLATE. BEFORE TIGHTENING CABLE STRAPS IN PLACE, WRAP WIRE AROUND CAM 180° TO 360° TO MINIMIZE PRESSURE ON CAM AND BOOT.



MODEL CODE BREAKDOWN



For satisfactory service life of these components, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from Vickers OFP, OFR, and OFRS series are recommended.

Litho in U. S. A.

Service Parts Information

Hydraulic
Remote
Control

HRC-S-**-**-H-10

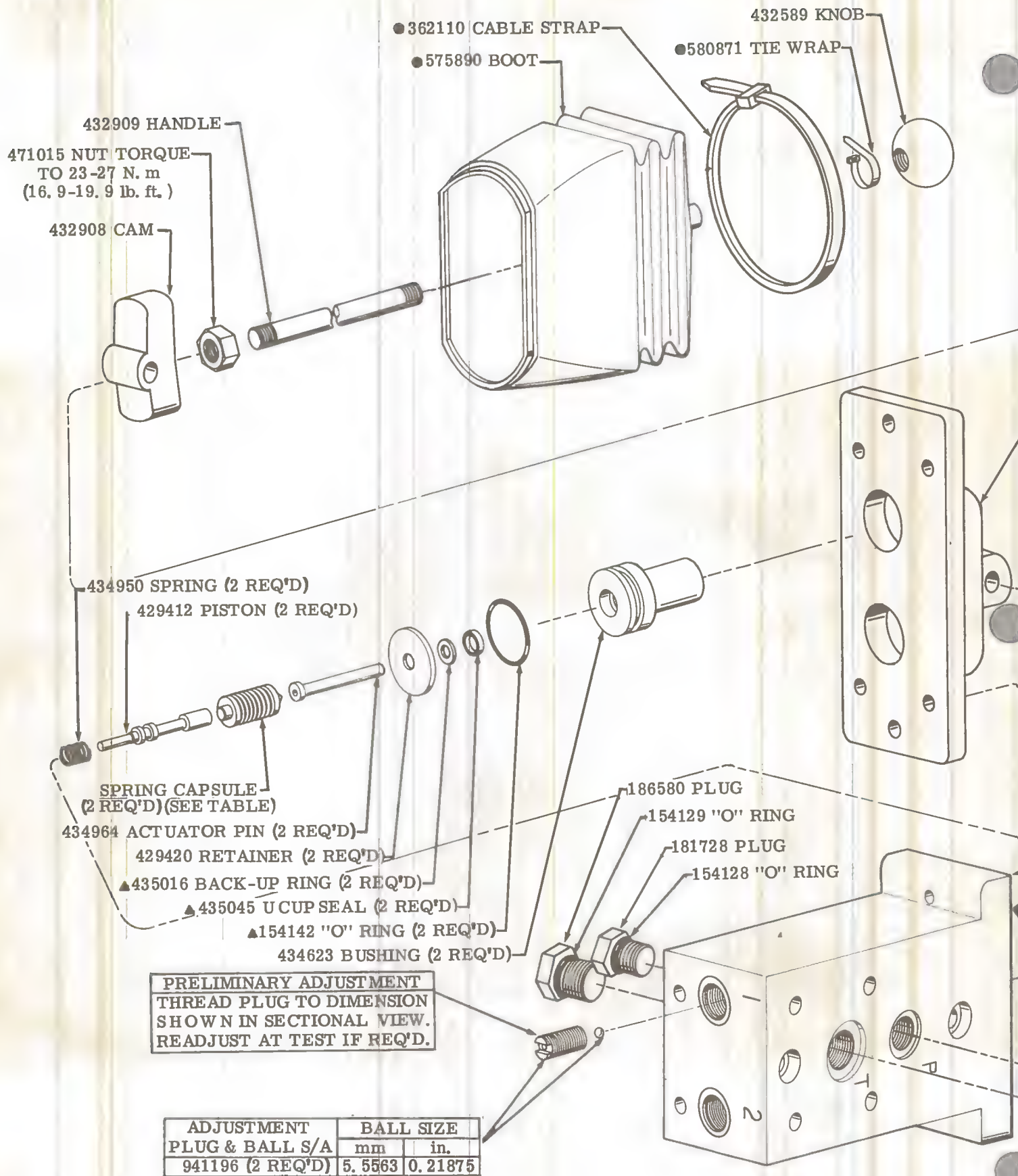


Vickers, Incorporated

P.O. Box 302
Troy, Michigan 48007-0302

Revised 12-1-87

M-2442-S



INCLUDED IN 920183 SEAL KIT
 INCLUDED IN 941290 BOOT KIT
 NOT AVAILABLE FOR SALE
 AVAILABLE ONLY IN KIT

REFER TO BACK PAGE
 FOR STUD & NUT KIT

76037 PIVOT PLATE

513770 PIN (STAKE
 AT ASSEMBLY)

4248 SCREW (4 REQ'D)
 TORQUE TO 8-11 N. m
 (5.9 - 8.1 lb. ft.)

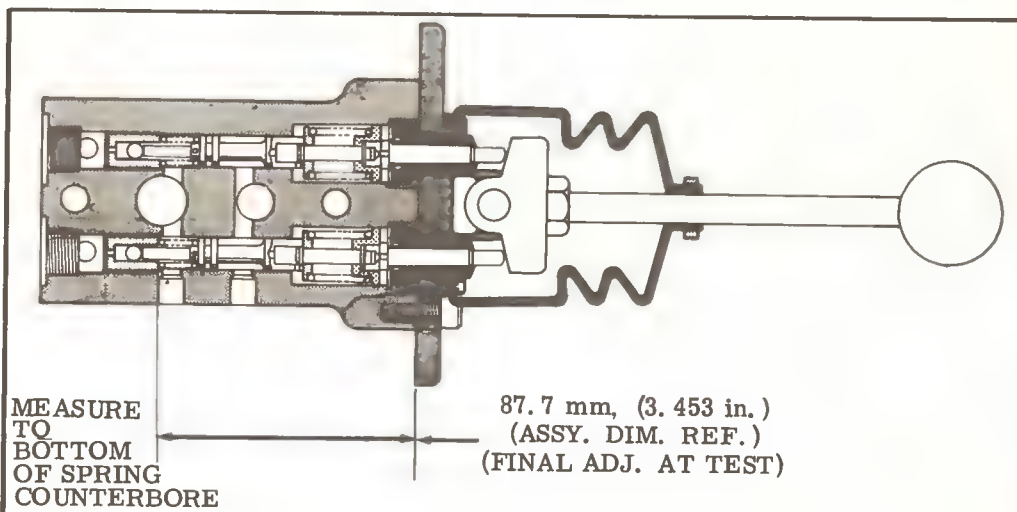
◆ BODY

APPLY A LIGHT COAT OF
 GREASE TO THIS SURFACE
 BEFORE ASSY OF PIVOT
 PLATE.

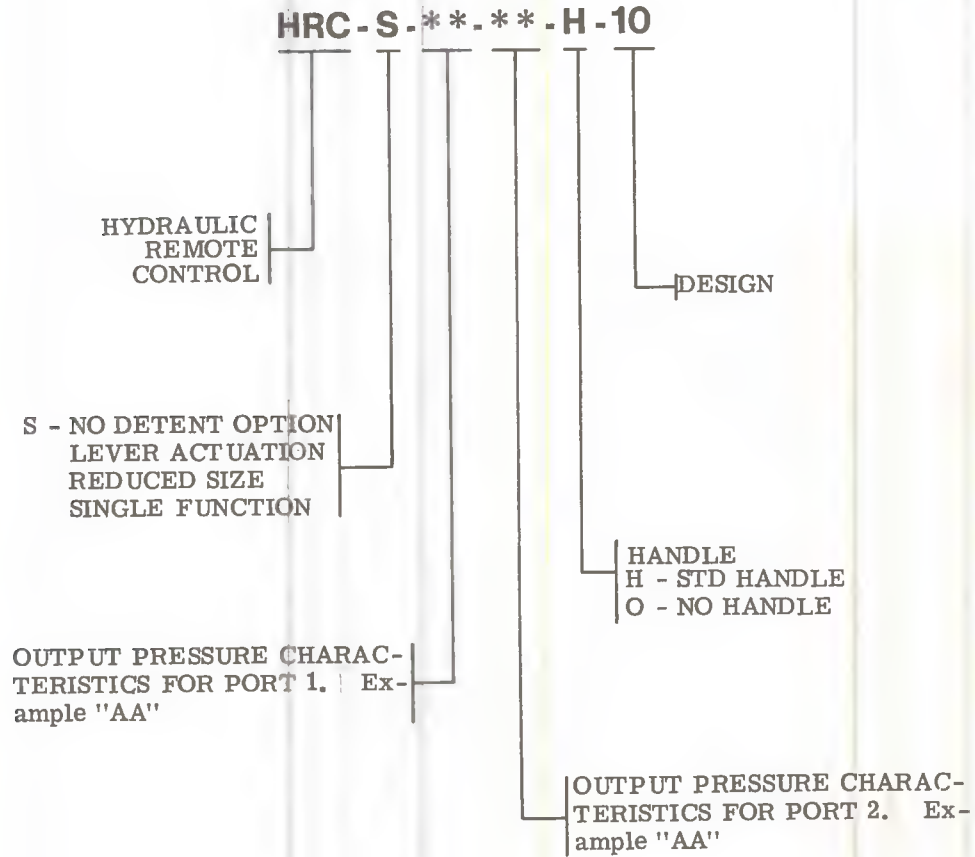
▲199812 "O" RING

▲166772 "O" RING

OUTLET PRESSURE CHARACTERISTIC	MODEL CODE	SPRING CAPSULE S/A	PRESSURE IN bar/PSIG	
			INITIAL	FINAL
Proportional	AA	433705	3.4/49.3	17/246.5
	AB	581351	3.4/49.3	22/319
	AC	573378	6/87	20/290
	AD	585922	3.4/49.3	24/348
	AE	582769	9/130.5	17/246.5
	AF	592078	3.4/49.3	16/232
	AH	432906	5/72.5	15/217.5
	AJ	633492	3.4/49.3	12/174.0
	AK	593369	3.4/49.3	15/217.5
	AL	631979	3.0/43.5	20/290.0
	AO	432918	3.4/49.3	14/203
	AP	592083	3.4/49.3	21/304.5
	AQ	592084	3.4/49.3	28/406
	AR	592086	6/87	16/232
	AS	593370	1/14.5	11/159.5
	AT	593371	5.2/75.4	8.3/120.35
	AU	593375	5/72.5	17.5/253.75
	AV	593377	5.4/78.3	16/232
	AW	594234	5.2/75.4	21/304.5
	AZ	595542	13/188.5	24/348
	EA	627849	3.4/49.3	19/275.5
	EB	593045	10/145	21/304.5
	EC	588900	0/0	11/159.5
	ED	583833	4.0/58.0	21/304.5
	EG	627882	5.0/72.5	14/203.0
	EH	627881	6.0/87.0	9.0/130.5
	EK	627879	8/116	19/275.2
	EL	627884	0/0	12/174.0
	EM	633496	10.0/145	26/377.0
Proportional with forced rise to supply pressure	BA	435664	0/0	20/290
	BB	435665	2/29	11/159.5
	BC	573353	5/72.5	22/319
	BD	575728	6/87	20/290
	BF	593379	5/72.5	20/290
	BG	435666	2/29	19/275.5
	BH	594659	9/130.5	20/290
	BJ	594655	0/0	14/203
	BL	576008	0/0	15/217.5
	BM	632209	0/0	12/174.0
Proportional with gain	CA	435667	1/14.5	11/159.5
	CB	589476	3/43.5	30/435
	CC	627848	10.0/145	21/304.5
	CD	627851	2.0/29.0	23/333.5
Proportional with gain change & forced rise to supply press.	DA	586095	4/58	23/333.5
	DB	589484	3/43.5	15.5/224.75



MODEL CODE BREAKDOWN



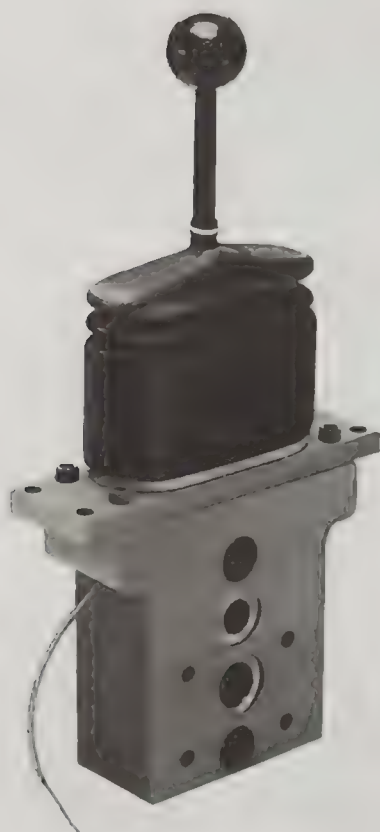
MODEL	HRC-S-P*-10 STUD & NUT KIT			
	NO. OF SECTIONS	ASS'Y NO.	STUD (2 REQ'D)	NUT (4 REQ'D)
HRC-S-P2-10	2	586088	578511	471014
HRC-S-P3-10	3	586089	578512	
HRC-S-P4-10	4	586090	578513	
HRC-S-P5-10	5	586091	578514	
HRC-S-P6-10	6	586092	578515	
HRC-S-P7-10	7	588890	578516	
HRC-S-P8-10	8	588891	578517	
HRC-S-P9-10	9	588892	578518	
HRC-S-P10-10	10	588893	578519	

For satisfactory service life of these components, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from Vickers OFP, OFR, and OFRS series are recommended.

Service Parts Information

Hydraulic
Remote
Control

HRC-M-***-***-H-10



Vickers, Incorporated

1401 Crooks Road
Troy, Michigan 48064

Revised 12-1-87

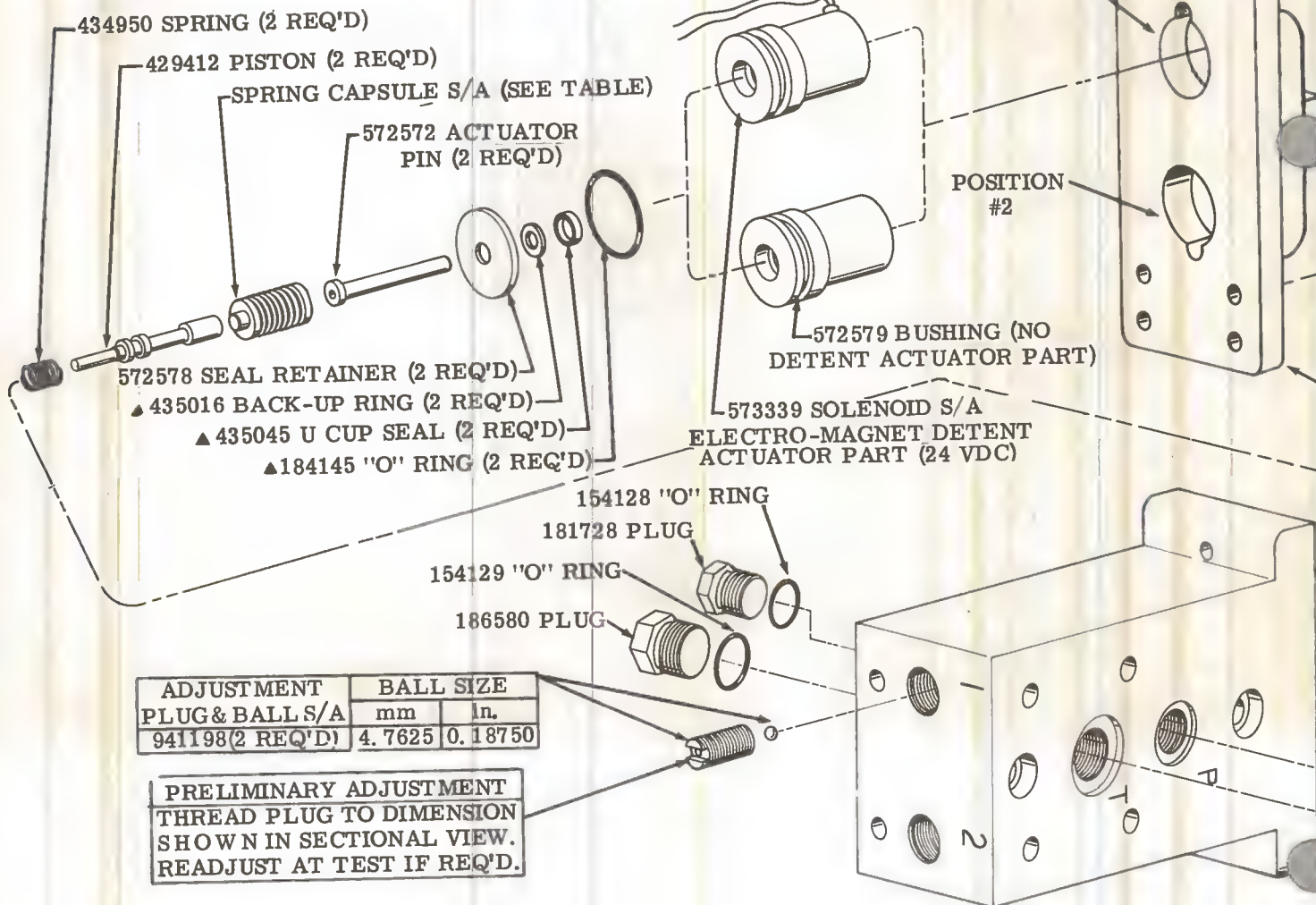
M-2443-S

OUTPUT PRESSURE CHARACTERISTIC	MODEL CODE	SPRING CAPSULE S/A	PRESS. IN bar/PSI	
			INITIAL	FINAL
Proportional	AC	590806	6.0/87	20/290
	AE	583834	9.0/130.5	17/246.5
	AF	628569	3.4/49.3	16/232
	AN	588866	3.4/49.3	103/1493.5
	AO	576024	3.4/49.3	14/203
	AP	595543	3.4/49.3	21/304.5
	AV	595554	5.4/78.3	16/232
	EE	587016	3.4/49.3	52/754
Proportional with forced rise to supply pressure	BD	575728	6.0/87	20/290
	BH	594688	9.0/130.5	20/290
	BK	592082	21/304.5	82/1189

MODEL	NO. OF SECTIONS	ASS'Y NO.	STUD (2 REQ'D)	NUT (4 REQ'D)
HRC-M-P2-10	2	588885	586647	471014
HRC-M-P3-10	3	588886	586648	
HRC-M-P4-10	4	588887	586649	
HRC-M-P5-10	5	588888	578515	
HRC-M-P6-10	6	588889	586650	
HRC-M-P7-10	7	597611	586651	
HRC-M-P8-10	8	597612	597615	
HRC-M-P9-10	9	597613	597616	
HRC-M-P10-10	10	597614	597617	

572570 CLAPPER

471128 SET SCREW (THREAD SCREW INTO CLAPPER UNTIL POINT IS FLUSH WITH FACE)



**941292
ELECTRO-MAGNET
DETENT ACTUATOR
PARTS KIT**

471012 NUT
TORQUE TO 10-12 N. m
(7.37 - 8.8 lb. ft.)

AX-1584 WASHER

471166 SET SCREW

471015 NUT (2 REQ'D)
TORQUE TO 23-27 N. m
(16.9 - 19.9 lb. ft.)

**NO DETENT
ACTUATOR
PARTS**

432589 KNOB

580871 TIE
WRAP

362110 CABLE STRAP
(BOOT LIP RETAINER)

572584 BOOT

432909 HANDLE

471015 NUT

593043 CAM

594681 PIN (STAKE
AT ASSEMBLY)

APPLY A LIGHT COAT OF GREASE
TO THE CAM & PIN AT ASSEMBLY.

474248 SCREW (4 REQ'D)
TORQUE TO 7-11 N. m
(5.1 - 8.1 lb. ft.)

▲INCLUDED IN 920181 SEAL KIT
◊INCLUDED IN 941291 BOCT KIT
◆NOT AVAILABLE FOR SALE
◊AVAILABLE ONLY IN KIT

573368 PIVOT PLATE

◆BODY S/A

NOTE: APPLY LIGHT COAT OF
GREASE TO THIS SURFACE BE-
FORE ASSY OF PIVOT PLATE.

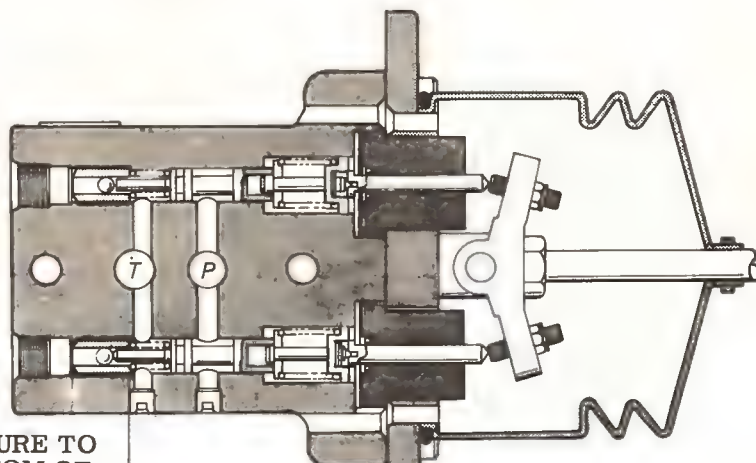
199812 "O" RING

166772 "O" RING

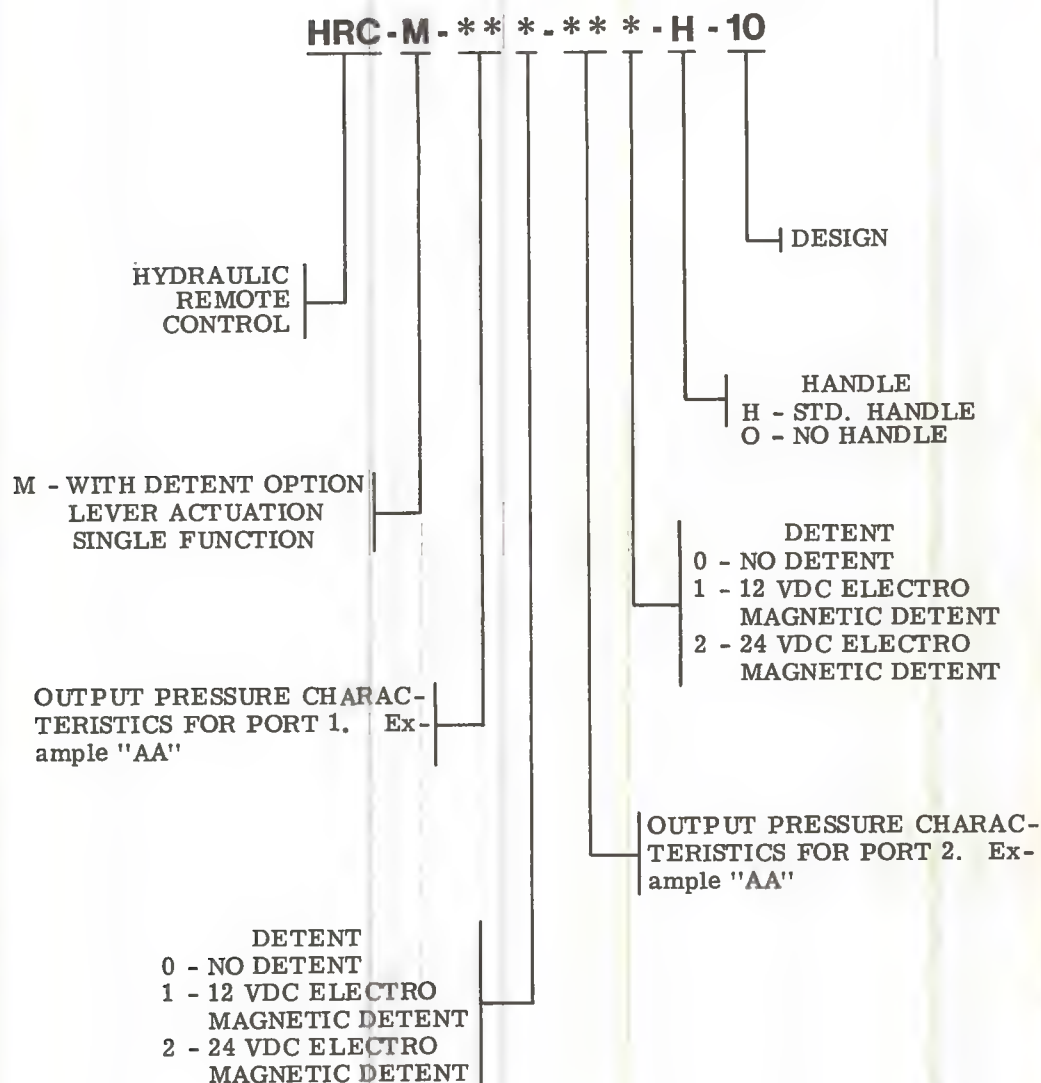
ONE EACH PER SECTION
WHEN USED IN A BANK.
OMIT FOR ONE
SECTION UNITS.

MEASURE TO
BOTTOM OF
SPRING
COUNTERBORE

87.7 mm, (3.453 in.)
(ASSY. DIM. REF.)
(FINAL ADJ. AT TEST)



MODEL CODE BREAKDOWN



For satisfactory service life of these components, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from Vickers OFP, OFR, and OFRS series are recommended.

Litho in U. S. A.

VICKERS®
A TRINOVIA COMPANY

Service Parts Information

Hydraulic
Remote
Control

HRC-F-**-**-10

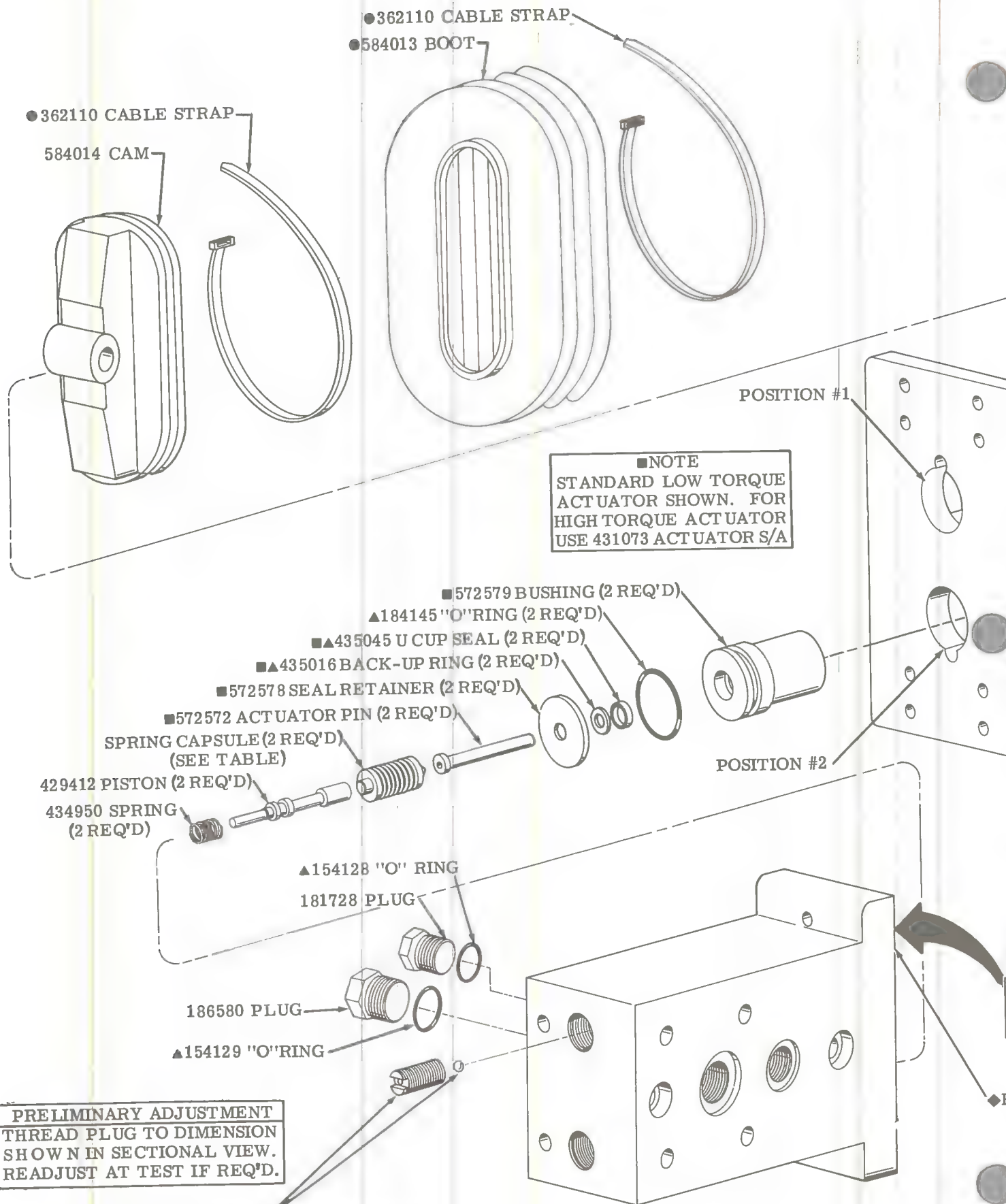


Vickers, Incorporated

P.O. Box 302
Troy, Michigan 48007-0302

Revised 12-1-87

M-2444-S



ADJUSTMENT PLUG & BALL S/A	BALL SIZE	
	mm	in.
941196 (2 REQ'D)	5.5563	0.2188

INCLUDED IN 920224 SEAL KIT
 INCLUDED IN 941310 BOOT KIT
 NOT AVAILABLE FOR SALE
 AVAILABLE ONLY IN KIT



594681 PIN (STAKE
 IN PLACE AT ASS'Y).



474248 SCREW (4 REQ'D)
 TORQUE TO 7-11 N. m
 (5.1 - 8.1 lb. ft.)

◆ 573368 PIVOT PLATE

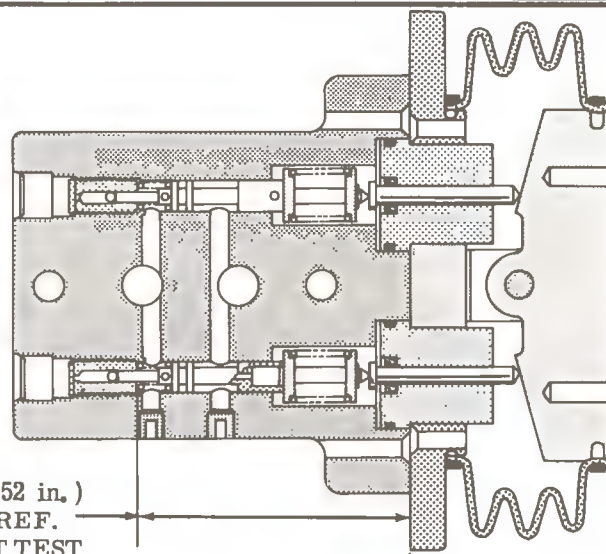
APPLY LIGHT COAT OF
 SE TO THIS SURFACE BE-
 ASSY OF PIVOT PLATE.

3/A



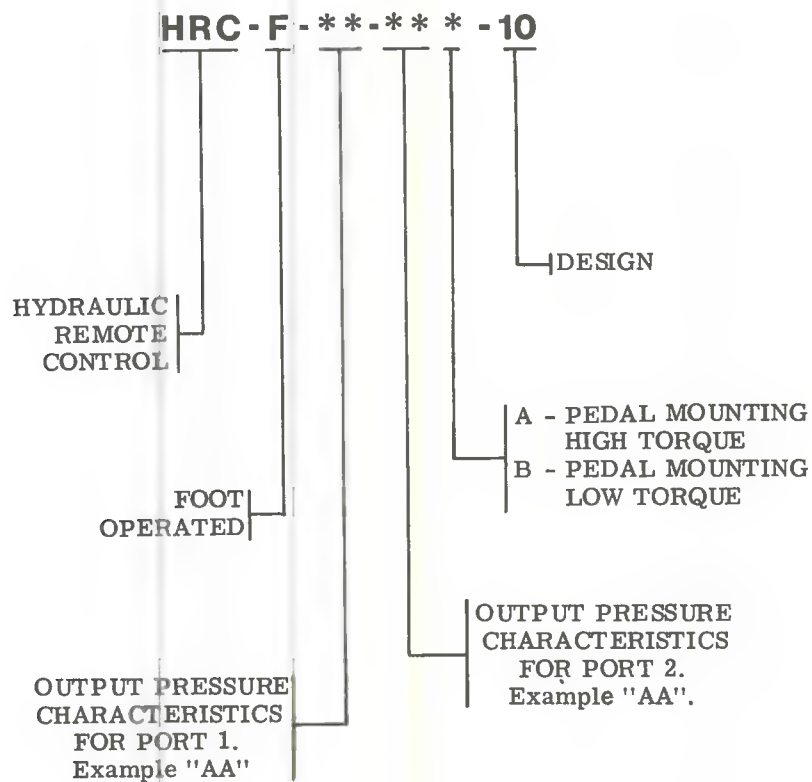
OUTLET PRESSURE CHARACTERISTIC	MODEL CODE	SPRING CAPSULE S/A	PRESSURE IN bar/ PSIG	
			INITIAL	FINAL
Proportional	AA	433705	3.4/49.3	17/246.5
	AB	581351	3.4/49.3	22/319
	AC	573378	6/87	20/290
	AD	585922	3.4/49.3	24/348
	AE	582769	9/130.5	17/246.5
	AF	592078	3.4/49.3	16/232
	AH	432906	5/72.5	15/217.5
	AJ	633492	3.4/49.3	12/174.0
	AK	593369	3.4/49.3	15/217.5
	AL	631979	3.0/43.5	20/290.0
	AO	432918	3.4/49.3	14/203
	AP	592083	3.4/49.3	21/304.5
	AQ	592084	3.4/49.3	28/406
	AR	592086	6/87	16/232
	AS	593370	1/14.5	11/159.5
	AT	593371	5.2/75.4	8.3/120.35
	AU	593375	5/72.5	17.5/253.75
	AV	593377	5.4/78.3	16/232
	AW	594234	5.2/75.4	21/304.5
	AZ	595542	13/188.5	24/348
	EA	627849	3.4/49.3	19/275.5
	EB	593045	10/145	21/304.5
	EC	588900	0/0	11/159.5
	ED	583833	4.0/58.0	21/304.5
Proportional with forced rise to supply pressure	EG	627882	5.0/72.5	14/203.0
	EH	627881	6.0/87.0	9.0/130.5
	EK	627879	0/0	19/275.2
	EL	627884	0/0	12/174.0
	EM	633496	10.0/145	26/377.0
	BA	435664	0/0	20/290
	BB	435665	2/29	11/159.5
	BC	573353	5/72.5	22/319
	BD	575728	6/87	20/290
	BF	593379	5/72.5	20/290
Proportional with gain	BG	435666	2/29	19/275.5
	BH	594659	9/130.5	20/290
	BJ	594655	0/0	14/203
	BL	576008	0/0	15/217.5
	BM	632209	0/0	12/174.0
	CA	435667	1/14.5	11/159.5
	CB	589476	3/43.5	30/435
	CC	627848	10.0/145	21/304.5
	CD	627851	2.0/29.0	23/333.5
	DA	586095	4/58	23/333.5
Proportional with gain change & forced rise to supply press.	DB	589484	3/43.5	15.5/224.75

MEASURE TO BOT-
 TOM OF SPRING
 COUNTERBORE



87.7 mm (3.452 in.)
 (ASS'Y DIM. REF.
 FINAL ADJ AT TEST)

MODEL CODE BREAKDOWN



For satisfactory service life of these components, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from Vickers OFP, OFR, and OFRS series are recommended.

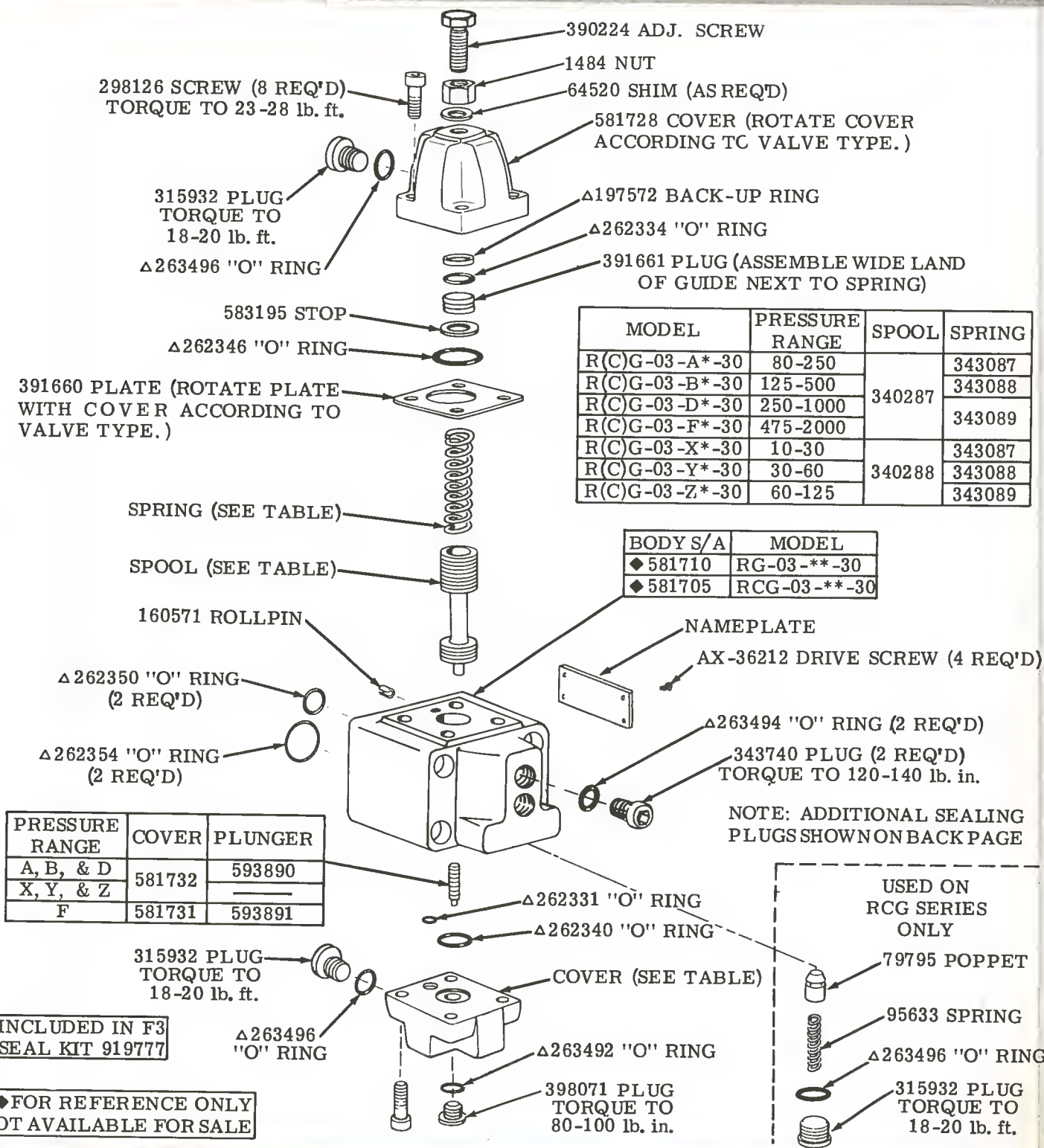
Litho in U. S. A.

Service Parts Information

PRESSURE CONTROL VALVES

R(C)G-03-**-30

VICKERS
A TRIMONA COMPANY



Vickers, Incorporated
P.O. Box 302
Troy, Michigan 48007-0302

Revised 11-1-85

I-3651-S

MODEL CODE BREAKDOWN

(F3)- R (C) G - 03 - * * - 30

SPECIAL SEALS
(OMIT ON STD.
MODELS)

PRESSURE
CONTROL VALVE

"C" - WITH INTEGRAL CHECK VALVE
(REVERSE FREE FLOW)
OMITTED - WITHOUT CHECK VALVE

MOUNTING
MANIFOLD OR
SUBPLATE

NOMINAL VALVE SIZE
03 - 3/8"

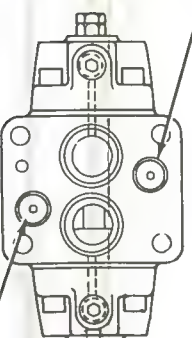
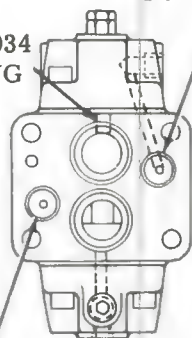
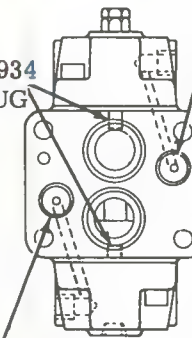
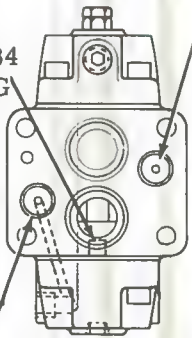
DESIGN

VALVE TYPES
(INSET VIEWS AT BOTTOM
OF PAGE SHOW COVER
POSITIONS FOR THE (4)
VALVE TYPES)

PRESSURE RANGE
A - 250 PSI MAX.
B - 500 PSI MAX.
D - 1000 PSI MAX.
F - 2000 PSI MAX.
X - 30 PSI MAX.
Y - 60 PSI MAX.
Z - 125 PSI MAX.

TYPICAL MODEL NUMBER
RCG-03-D4-30

NOTE: ASSEMBLE COVERS AS SHOWN TO OBTAIN VALVE ACTION DESIRED.

TYPE 1	TYPE 2	TYPE 3	TYPE 4
RG SERIES - BACK PRESSURE VALVE RCG SERIES - COUNTERBALANCE VALVE DIRECTLY CONTROLLED INTERNAL DRAIN	RG OR RCG SERIES- SEQUENCE VALVES DIRECTLY CONTROLLED EXTERNAL DRAIN	RG OR RCG SERIES- SEQUENCE VALVES REMOTELY CONTROLLED EXTERNAL DRAIN	RG SERIES- UNLOADING VALVE RCG SERIES- COUNTERBALANCE VALVE REMOTELY CONTROLLED INTERNAL DRAIN
 <p>BLOCKED</p> <p>REMOTE CONTROL IS BLOCKED</p>	 <p>Δ261934 PLUG</p> <p>CONNECT TO TANK</p> <p>REMOTE CONTROL IS BLOCKED</p>	 <p>Δ261934 PLUG</p> <p>CONNECT TO TANK</p> <p>REMOTE CONTROL CONNECTION</p>	 <p>BLOCKED</p> <p>Δ261934 PLUG</p> <p>REMOTE CONTROL CONNECTION</p>

For satisfactory service life of these components, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from Vickers OFP, OFR, and OFRS series are recommended.

Litho in U. S. A.

Service Parts Information

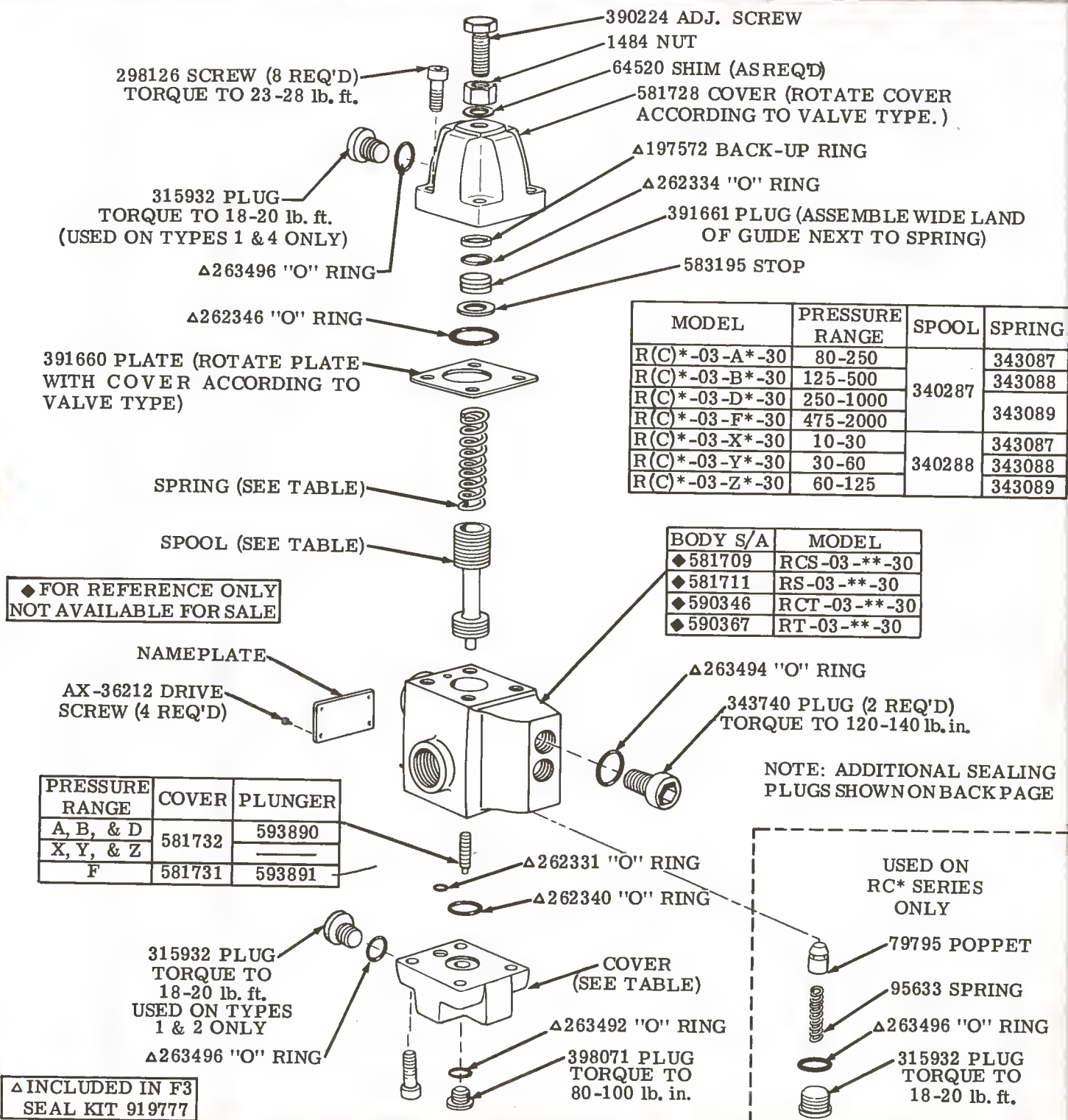
PRESSURE CONTROL VALVES

R(C)T-03-**-30

R(C)S-03-**-30

VICKERS

A TRIMONA COMPANY



Vickers, Incorporated
P.O. Box 302
Troy, Michigan 48007-0302

Revised 11-1-85

I-3652-S

35

MODEL CODE BREAKDOWN

F3-R (C) * - 03 - * * - 30

SPECIAL
SEALS

PRESSURE
CONTROL VALVE

DESIGN

"C" - WITH INTEGRAL CHECK VALVE
(REVERSE FREE FLOW)
OMITTED - WITHOUT CHECK VALVE

VALVE TYPES
(INSET VIEWS AT BOTTOM
OF PAGE SHOW COVER
POSITIONS FOR THE (4)
VALVE TYPES)

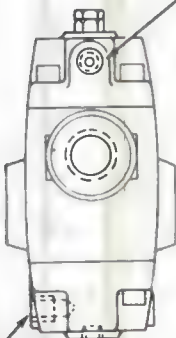
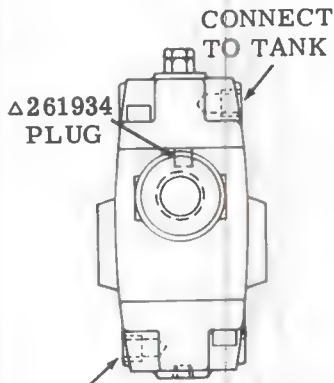
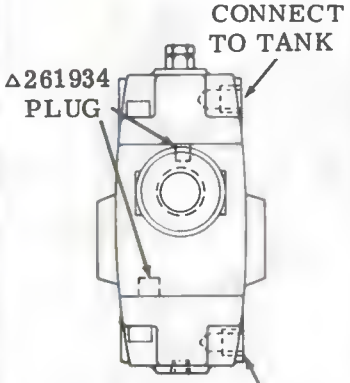
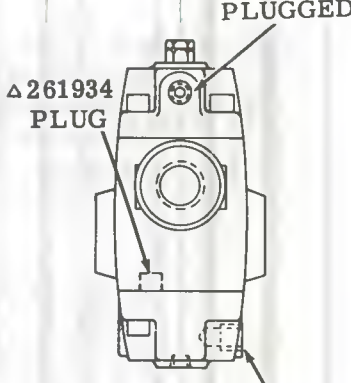
MOUNTING
S - .750-16 UNF-2B THREAD
T - 3/8" NPTF THREAD

PRESSURE RANGE
A - 80 - 250 PSI
B - 125 - 500 PSI
D - 250 - 1000 PSI
F - 475 - 2000 PSI
X - 10 - 30 PSI
Y - 30 - 60 PSI
Z - 60 - 125 PSI

CONNECTION SIZE
03 - 3/8"

TYPICAL MODEL NUMBER
RCT-03-D4-30

NOTE: ASSEMBLE COVERS AS SHOWN TO OBTAIN VALVE ACTION DESIRED.

TYPE 1	TYPE 2	TYPE 3	TYPE 4
RT SERIES BACK PRESSURE VALVE RCT SERIES- COUNTERBALANCE VALVE DIRECTLY CONTROLLED INTERNAL DRAIN	RT OR RCT SERIES- SEQUENCE VALVES DIRECTLY CONTROLLED EXTERNAL DRAIN	RT OR RCT SERIES- SEQUENCE VALVES REMOTELY CONTROLLED EXTERNAL DRAIN	RT SERIES- UNLOADING VALVE RCT SERIES- COUNTERBALANCE VALVE REMOTELY CONTROLLED INTERNAL DRAIN
 <p>PLUGGED</p> <p>PLUGGED</p>	 <p>CONNECT TO TANK</p> <p>Δ261934 PLUG</p> <p>PLUGGED</p>	 <p>CONNECT TO TANK</p> <p>Δ261934 PLUG</p> <p>REMOTE CONTROL CONNECTION</p>	 <p>PLUGGED</p> <p>Δ261934 PLUG</p> <p>REMOTE CONTROL CONNECTION</p>

For satisfactory service life of these components, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from Vickers OFF, OFR, and OFRS series are recommended.

Litho in U. S. A.

Service Parts Information

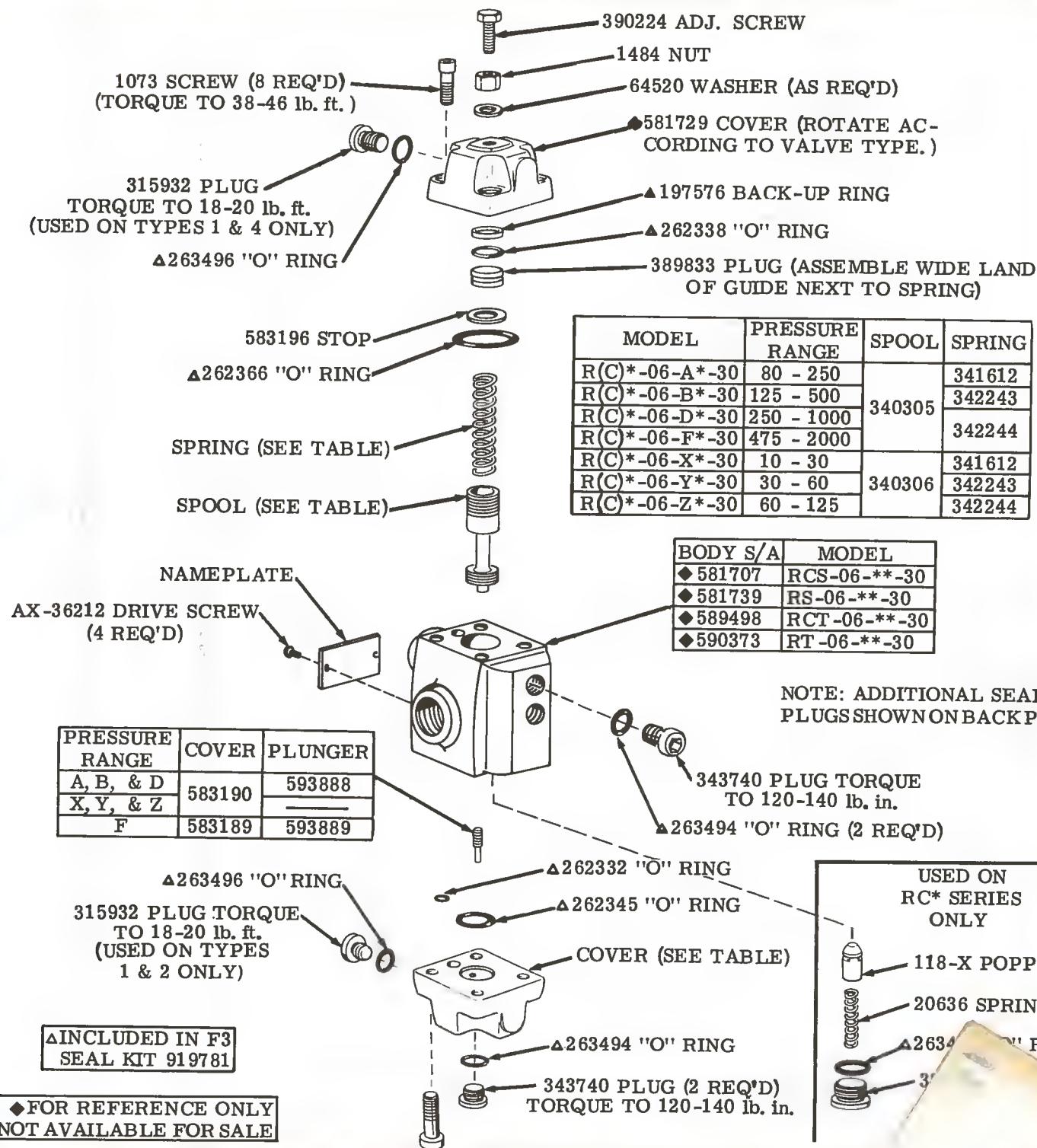
VICKERS

A TRIMONA COMPANY

PRESSURE CONTROL VALVES

R(C)T-06-**-30

R(C)S-06-**-30



Vickers, Incorporated
P.O. Box 302
Troy, Michigan 48007-0302

Revised 7-1-85

MODEL CODE BREAKDOWN

F3-R (C) * - 06 - * * - 30

SPECIAL SEALS

PRESSURE
CONTROL VALVE

"C" - WITH INTEGRAL CHECK VALVE
(REVERSE FREE FLOW)
OMITTED - WITHOUT CHECK VALVE

MOUNTING
S - 1.0625-12 UN-2B THREAD
T - 3/4" NPTF THREAD

CONNECTION SIZE
06 - 3/4" PIPE THD.

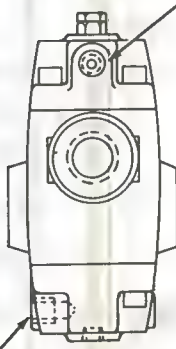
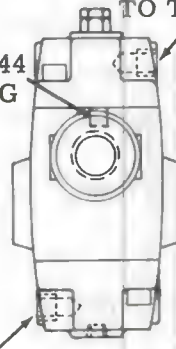
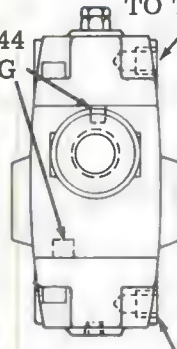
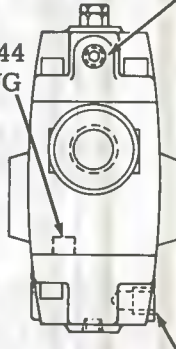
DESIGN

VALVE TYPES
(INSET VIEWS AT BOTTOM
OF PAGE SHOW COVER
POSITIONS FOR THE (4)
VALVE TYPES)

PRESSURE RANGE
A - 80 - 250 PSI
B - 125 - 500 PSI
D - 250 - 1000 PSI
F - 475 - 2000 PSI
X - 10 - 30 PSI
Y - 30 - 60 PSI
Z - 60 - 125 PSI

TYPICAL MODEL NUMBER
RCT-06-D4-30

NOTE: ASSEMBLE COVERS AS SHOWN TO OBTAIN VALVE ACTION DESIRED.

TYPE 1	TYPE 2	TYPE 3	TYPE 4
RT SERIES BACK PRESSURE VALVE RCT SERIES- COUNTERBALANCE VALVE DIRECTLY CONTROLLED INTERNAL DRAIN	RT OR RCT SERIES- SEQUENCE VALVES DIRECTLY CONTROLLED EXTERNAL DRAIN	RT OR RCT SERIES- SEQUENCE VALVES REMOTELY CONTROLLED EXTERNAL DRAIN	RT SERIES- UNLOADING VALVE RCT SERIES- COUNTERBALANCE VALVE REMOTELY CONTROLLED INTERNAL DRAIN
 <p>PLUGGED</p> <p>PLUGGED</p>	 <p>CONNECT TO TANK</p> <p>Δ271344 PLUG</p> <p>PLUGGED</p>	 <p>CONNECT TO TANK</p> <p>Δ271344 PLUG</p> <p>REMOTE CONTROL CONNECTION</p>	 <p>PLUGGED</p> <p>Δ271344 PLUG</p> <p>REMOTE CONTROL CONNECTION</p>

For satisfactory service life of these components in industrial applications, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from Vickers OFP, OFR, OFS series are recommended.

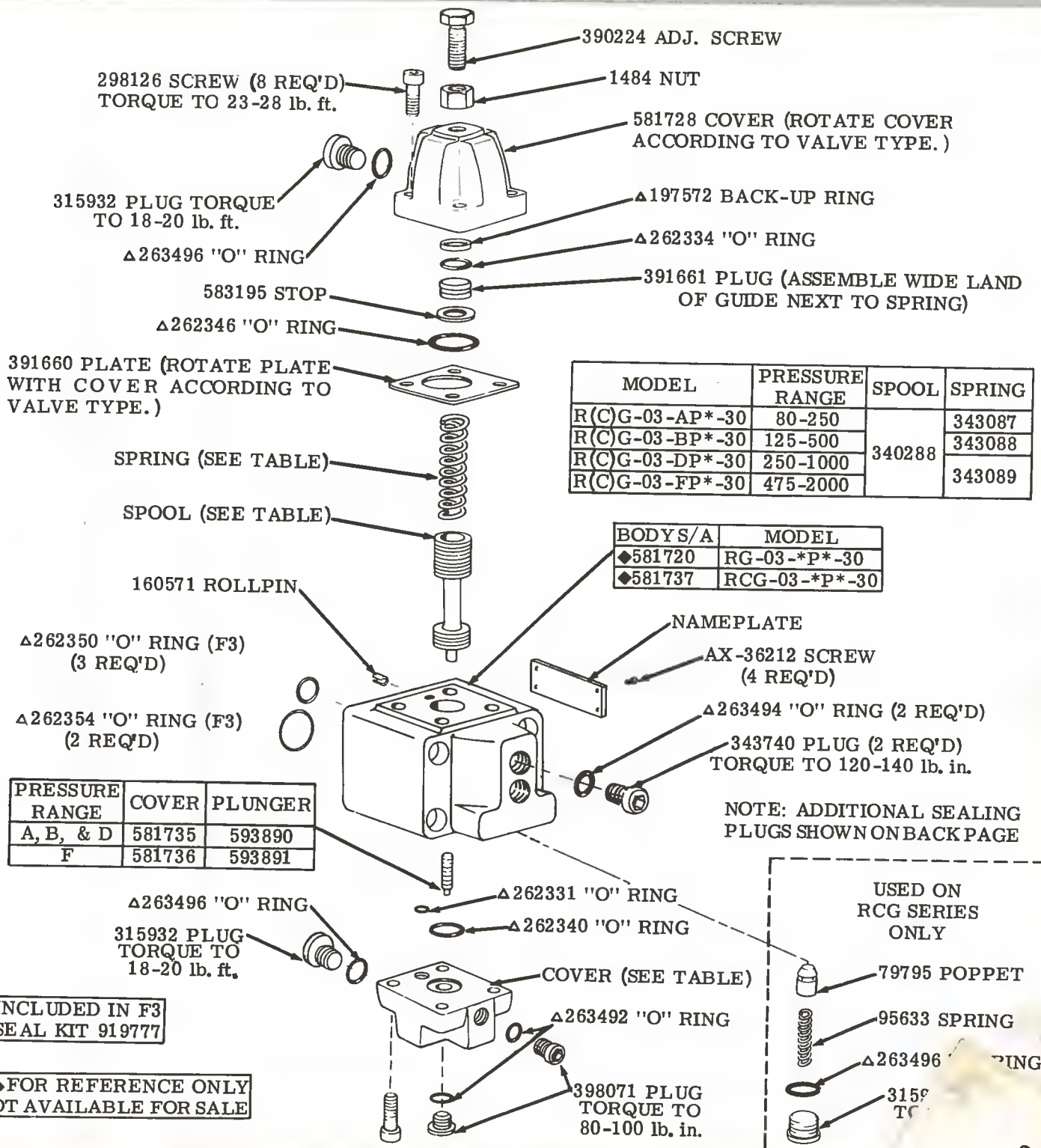
Litho in U. S. A.

Service Parts Information

PRESSURE CONTROL VALVES

R(C)G-03-*P*-30

VICKERS
A TRIMONA COMPANY



Vickers, Incorporated
P.O. Box 302
Troy, Michigan 48007-0302

Revised 11-1-85

MODEL CODE BREAKDOWN

(F3)- R (C) G-03-*P*-30

SPECIAL SEALS
(OMIT FOR STD.
MODELS)

PRESSURE
CONTROL VALVE

DESIGN

"C" - WITH INTEGRAL CHECK VALVE
(REVERSE FREE FLOW)
OMITTED - WITHOUT CHECK VALVE

MOUNTING
MANIFOLD OR SUBPLATE

VALVE TYPES
(INSET VIEWS AT
BOTTOM OF PAGE
SHOW COVER PO-
SITIONS FOR THE
(4) VALVE TYPES)

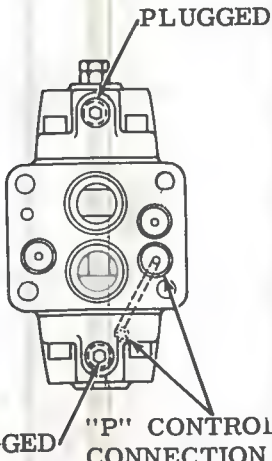
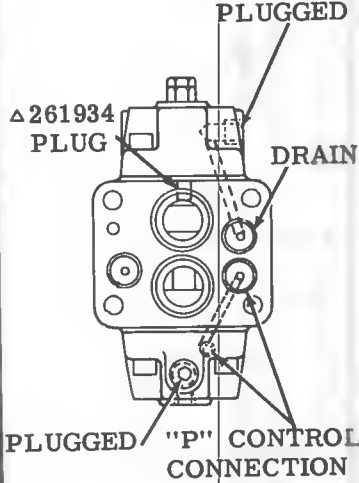
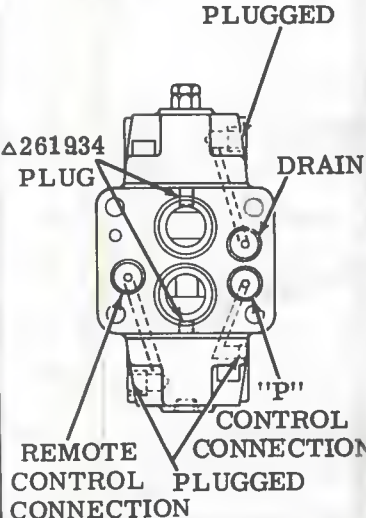
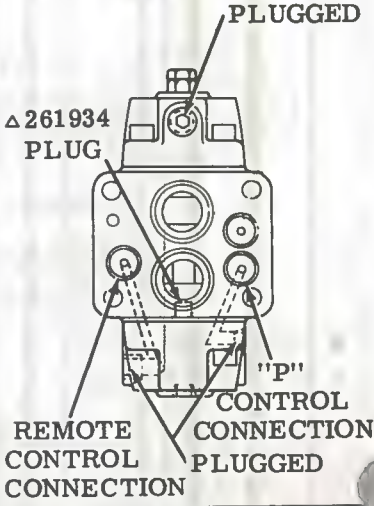
NOMINAL VALVE SIZE
03 - 3/8"

AUXILIARY REMOTE PRESSURE
CONTROL CONNECTION

PRESSURE RANGE
A - 80-250 P.S.I.
B - 125-500 P.S.I.
D - 250-1000 P.S.I.
F - 475-2000 P.S.I.

TYPICAL MODEL NUMBER
RCG-03-DP4-30

NOTE: ASSEMBLE COVERS AS SHOWN TO OBTAIN VALVE ACTION DESIRED.

TYPE 1	TYPE 2	TYPE 3	TYPE 4
RG SERIES - BACK PRESSURE VALVE RCG SERIES - COUNTERBALANCE VALVE DIRECTLY CONTROLLED INTERNAL DRAIN	RG OR RCG SERIES- SEQUENCE VALVES DIRECTLY CONTROLLED EXTERNAL DRAIN	RG OR RCG SERIES- SEQUENCE VALVES REMOTELY CONTROLLED EXTERNAL DRAIN	RG SERIES- UNLOADING VALVE RCG SERIES- COUNTERBALANCE VALVE REMOTELY CONTROLLED INTERNAL DRAIN
			

For satisfactory service life of these components, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from Vickers OFP, OFR, and OFRS series are recommended.

Litho in U. S. A.

Service Parts Information

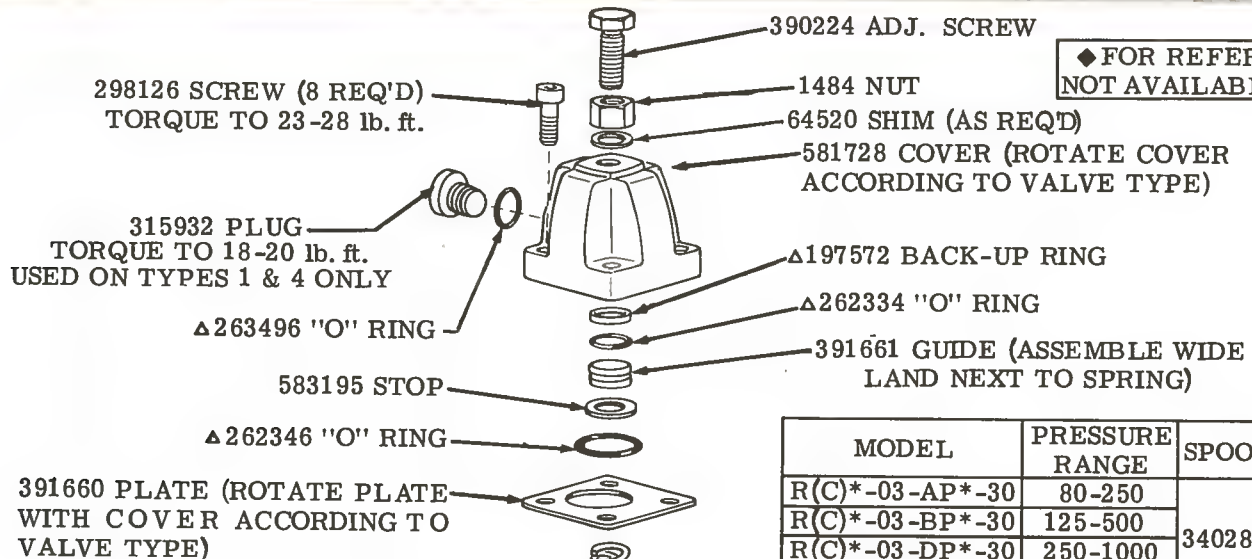
VICKERS
A TRIMOVA COMPANY

PRESSURE CONTROL VALVES

R(C)T-03-*P*-30

R(C)S-03-*P*-30

◆ FOR REFERENCE ONLY
NOT AVAILABLE FOR SALE

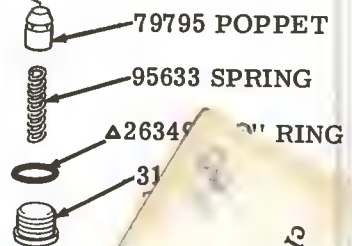


NOTE: ADDITIONAL SEALING
PLUGS SHOWN ON BACK PAGE.

BODY S/A	MODEL
◆581709	RCS-03-*P*-30
◆581711	RS-03-*P*-30
◆590346	RCT-03-*P*-30
◆590367	RT-03-*P*-30

PRESSURE RANGE	COVER	PLUNGER
A, B, & D	581733	593890
F	581734	593891

USED ON
RC* SERIES
ONLY



Δ INCLUDED IN F3
SEAL KIT 919777

Vickers, Incorporated
P.O. Box 302
Troy, Michigan 48007-0302

Revised 11-1-85

MODEL CODE BREAKDOWN

F3 - R (C) * -03-*P*-30

SPECIAL SEALS

PRESSURE
CONTROL VALVE

"C" - WITH INTEGRAL CHECK VALVE
(REVERSE FREE FLOW)
OMITTED - WITHOUT CHECK VALVE

MOUNTING
S - .750-16 UNF-2B THREAD
T - 3/8" NPTF THREAD

CONNECTION SIZE
03 - 3/8"

PRESSURE RANGE
A - 80-250 P.S.I.
B - 125-500 P.S.I.
D - 250-1000 P.S.I.
F - 475-2000 P.S.I.

DESIGN

VALVE TYPES
(INSET VIEWS AT
BOTTOM OF PAGE
SHOW COVER PO-
SITIONS FOR THE
(4) VALVE TYPES)

AUXILIARY REMOTE PRESSURE
CONTROL CONNECTION

TYPICAL MODEL NUMBER
RCT-03-DP4-30

NOTE: ASSEMBLE COVERS AS SHOWN TO OBTAIN VALVE ACTION DESIRED.

TYPE 1	TYPE 2	TYPE 3	TYPE 4
RT SERIES BACK PRESSURE VALVE RCT SERIES- COUNTERBALANCE VALVE DIRECTLY CONTROLLED INTERNAL DRAIN	RT OR RCT SERIES- SEQUENCE VALVES DIRECTLY CONTROLLED EXTERNAL DRAIN	RT OR RCT SERIES- SEQUENCE VALVES REMOTELY CONTROLLED EXTERNAL DRAIN	RT SERIES- UNLOADING VALVE RCT SERIES- COUNTERBALANCE VALVE REMOTELY CONTROLLED INTERNAL DRAIN

For satisfactory service life of these components, use full flow filtration to provide fluid which meets ISO
ness code 18/15 or cleaner. Selections from Vickers OFF, OFR, and OFRS series are recommended.

Litho in U. S. A.

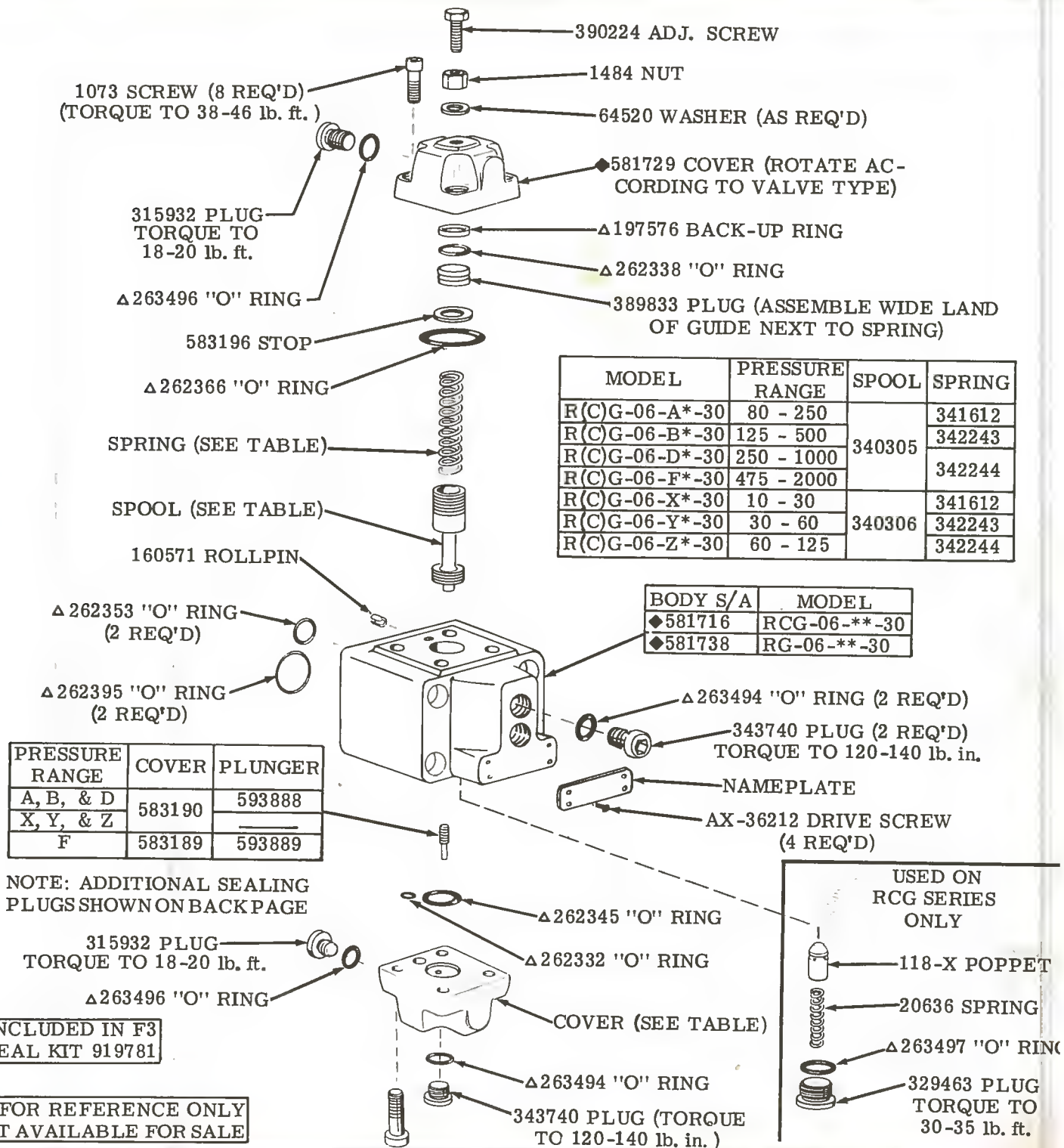
Service Parts Information

VICKERS

A TRIMCOVA COMPANY

PRESSURE CONTROL VALVES

R(C)G-06-**-30



Vickers, Incorporated
P.O. Box 302
Troy, Michigan 48007-0302

Revised 5-1-85

I-3655-S

MODEL CODE BREAKDOWN

(F3)- R (C) G - 06 * * - 30

SPECIAL SEALS
(OMIT FOR STD
MODELS)

PRESSURE ACTUATED
CONTROL VALVE

"C" - WITH INTEGRAL CHECK VALVE
(REVERSE FREE FLOW)
OMITTED - WITHOUT CHECK VALVE

MOUNTING
MANIFOLD OR
SUBPLATE

NOMINAL VALVE SIZE
06 - 3/4"

DESIGN

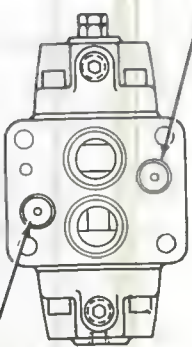
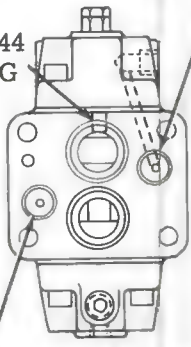
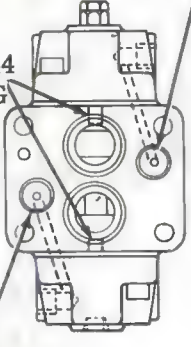
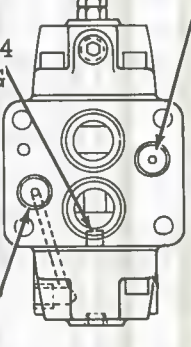
VALVE TYPES
(INSET VIEWS AT BOTTOM
OF PAGE SHOW COVER
POSITIONS FOR THE (4)
VALVE TYPES)

PRESSURE RANGE

A - 80-250 PSI
B - 125-500 PSI
D - 250-1000 PSI
F - 475-2000 PSI
X - 10-30 PSI
Y - 30-60 PSI
Z - 60-125 PSI

TYPICAL MODEL NUMBER
RCG-06-D4-30

NOTE: ASSEMBLE COVERS AS SHOWN TO OBTAIN VALVE ACTION DESIRED.

TYPE 1	TYPE 2	TYPE 3	TYPE 4
RG SERIES - BACK PRESSURE VALVE CG SERIES - COUNTERBALANCE VALVE IRECTLY CONTROLLED INTERNAL DRAIN	RG OR RCG SERIES- SEQUENCE VALVES DIRECTLY CONTROLLED EXTERNAL DRAIN	RG OR RCG SERIES- SEQUENCE VALVES REMOTELY CONTROLLED EXTERNAL DRAIN	RG SERIES- UNLOADING VALVE RCG SERIES- COUNTERBALANCE VALVE REMOTELY CONTROLLED INTERNAL DRAIN
 <p>BLOCKED</p> <p>REMOTE CONTROL S BLOCKED</p>	 <p>CONNECT TO TANK</p> <p>Δ271344 PLUG</p> <p>REMOTE CONTROL IS BLOCKED</p>	 <p>CONNECT TO TANK</p> <p>Δ271344 PLUG</p> <p>REMOTE CONTROL CONNECTION</p>	 <p>BLOCKED</p> <p>Δ271344 PLUG</p> <p>REMOTE CONTROL CONNECTION</p>

For satisfactory service life of these components in industrial applications, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from Vickers OFP, OFR, and OFRS series are recommended.

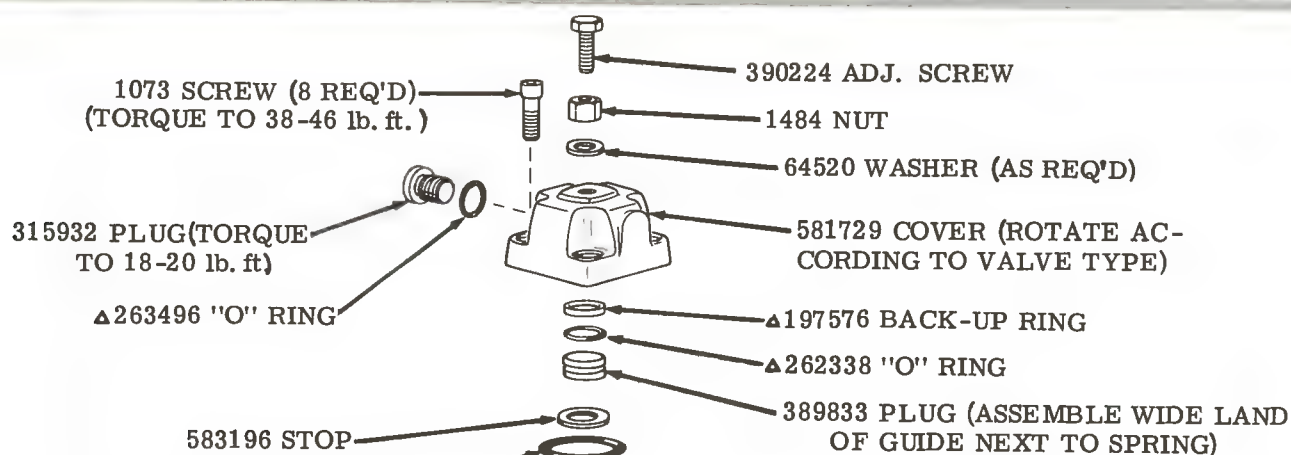
Litho in U. S. A.

Service Parts Information

PRESSURE CONTROL VALVES

R(C)G-06-*P*-30

VICKERS
A TRIMONA COMPANY

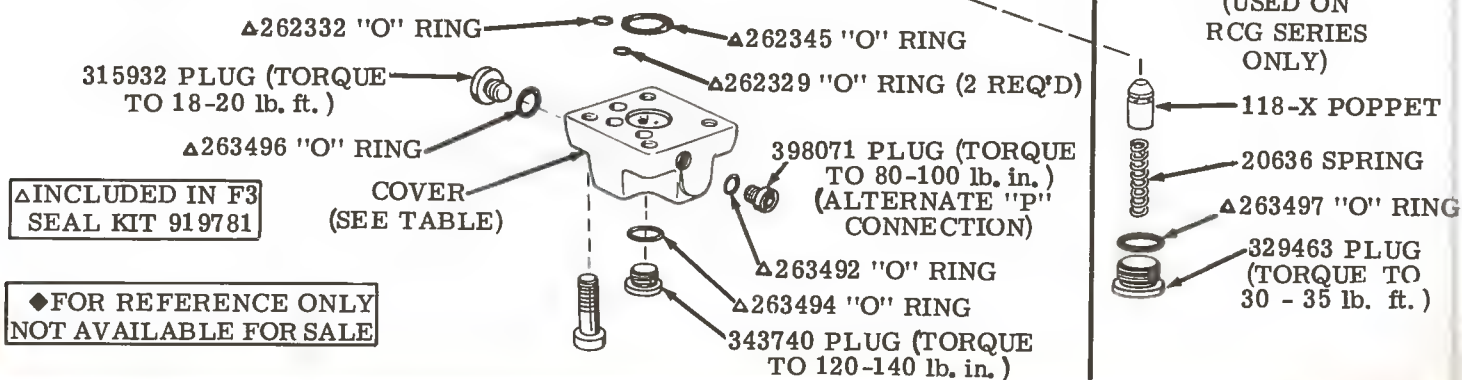


MODEL	PRESSURE RANGE	SPOOL	SPRING
R(C)G-06-AP*-30	80-250	340306	341612
R(C)G-06-BP*-30	125-500		342243
R(C)G-06-DP*-30	250-1000		342244
R(C)G-06-FP*-30	475-2000		

BODY S/A	MODEL
◆ 581724	RCG-06-*P*-30
◆ 581722	RG-06-*P*-30

PRESSURE RANGE	COVER	PLUNGER
A, B, & D	583193	593888
F	583194	593889

NOTE: ADDITIONAL SEALING PLUGS SHOWN ON BACK PAGE



Δ INCLUDED IN F3
SEAL KIT 919781

◆ FOR REFERENCE ONLY
NOT AVAILABLE FOR SALE

Vickers, Incorporated
P.O. Box 302
Troy, Michigan 48007-0302

Revised 11-1-85

I-3656-S

40

MODEL CODE BREAKDOWN

(F3)-R (C) G-06-*P*-30

SPECIAL SEALS
(OMIT FOR STD
MODELS)

PRESSURE
CONTROL VALVE

"C" - WITH INTEGRAL CHECK VALVE
(REVERSE FREE FLOW)
OMITTED - WITHOUT CHECK VALVE

MOUNTING
MANIFOLD OR SUBPLATE

NOMINAL VALVE SIZE
06 - 3/4"

PRESSURE RANGE
A - 80-250 P.S.I.
B - 125-500 P.S.I.
D - 250-1000 P.S.I.
F - 475-2000 P.S.I.

DESIGN

VALVE TYPES
(INSET VIEWS AT
BOTTOM OF PAGE
SHOW COVER PO-
SITIONS FOR THE
(4) VALVE TYPES)

AUXILIARY REMOTE PRESSURE
CONTROL CONNECTION

TYPICAL MODEL NUMBER
RCG-06-DP4-30

NOTE: ASSEMBLE COVERS AS SHOWN TO OBTAIN VALVE ACTION DESIRED.

TYPE 1	TYPE 2	TYPE 3	TYPE 4
RG SERIES - BACK PRESSURE VALVE RCG SERIES - COUNTERBALANCE VALVE DIRECTLY CONTROLLED INTERNAL DRAIN	RG OR RCG SERIES- SEQUENCE VALVES DIRECTLY CONTROLLED EXTERNAL DRAIN	RG OR RCG SERIES- SEQUENCE VALVES REMOTELY CONTROLLED EXTERNAL DRAIN	RG SERIES- UNLOADING VALVE RCG SERIES- COUNTERBALANCE VALVE REMOTELY CONTROLLED INTERNAL DRAIN

For satisfactory service life of these components, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from Vickers OFP, OFR, and OFRS series are recommended.

Litho in U. S. A.

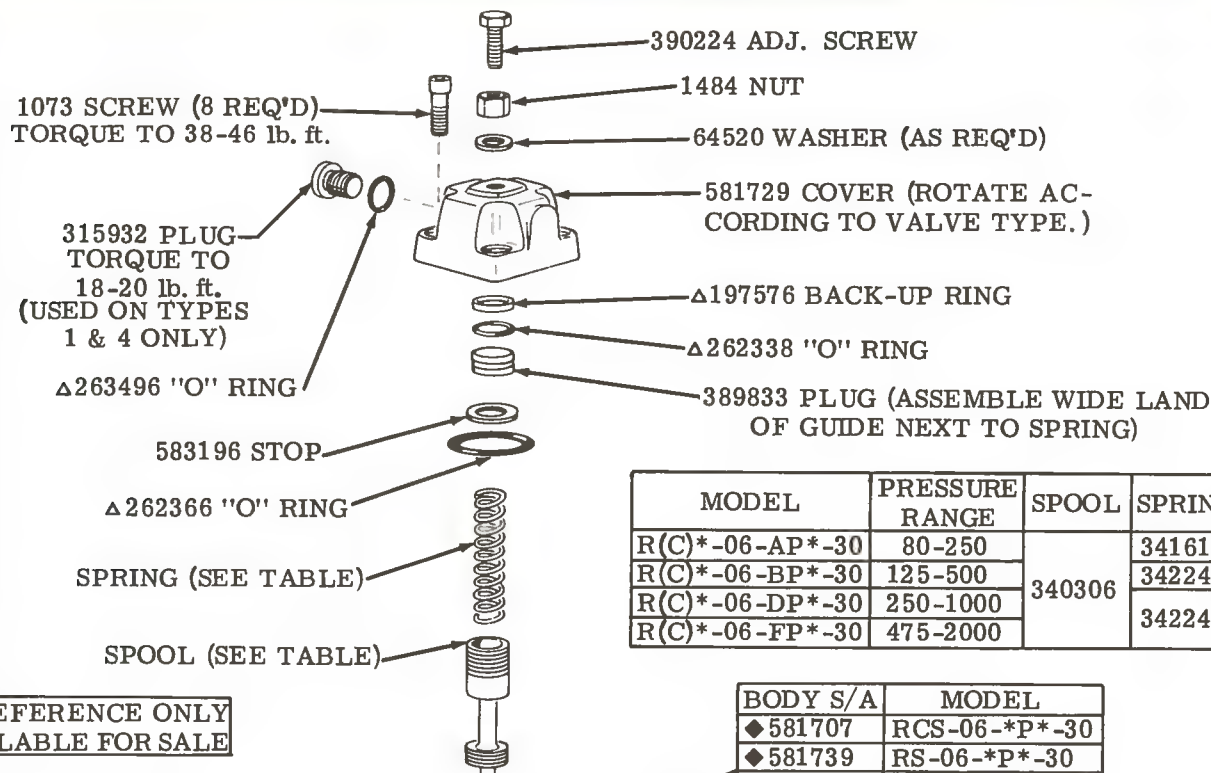
Service Parts Information

PRESSURE CONTROL VALVES

VICKERS®
A TRIMONA COMPANY

R(C)S-06-*P*-30

R(C)T-06-*P*-30




MODEL	PRESSURE RANGE	SPOOL	SPRING
R(C)*-06-AP*-30	80-250	340306	341612
R(C)*-06-BP*-30	125-500		342243
R(C)*-06-DP*-30	250-1000		342244
R(C)*-06-FP*-30	475-2000		

BODY S/A	MODEL
◆581707	RCS-06-*P*-30
◆581739	RS-06-*P*-30
◆589498	RCT-06-*P*-30
◆590373	RT-06-*P*-30

◆ FOR REFERENCE ONLY
NOT AVAILABLE FOR SALE

NAMEPLATE

AX-36212 DRIVE
SCREW (4 REQ'D)



PRESSURE
RANGE

COVER

PLUNGER

A, B, & D

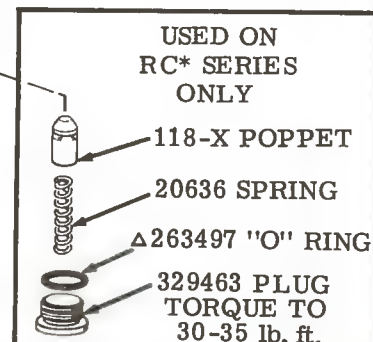
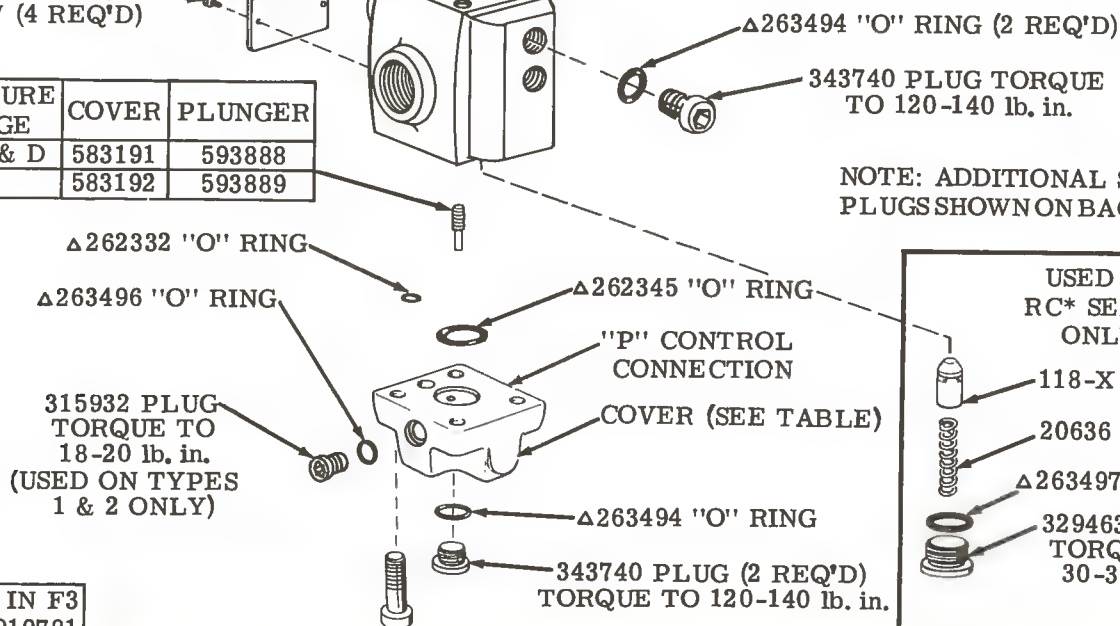
583191

593888

F

583192

593889



Δ INCLUDED IN F3
SEAL KIT 919781

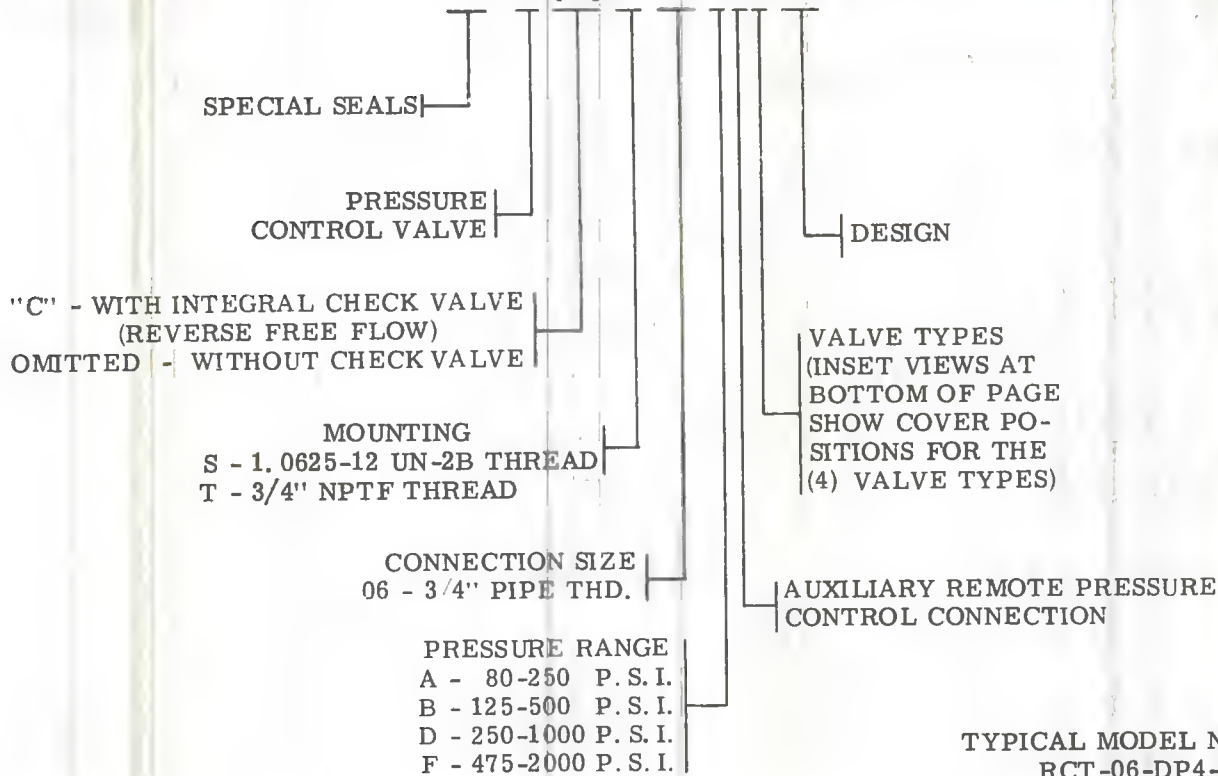
Vickers, Incorporated
P.O. Box 302
Troy, Michigan 48007-0302

Revised 11-1-85

I-3658-S

MODEL CODE BREAKDOWN

F3 - R (C) * -06-*P*-30



TYPICAL MODEL NUMBER
RCT-06-DP4-30

NOTE: ASSEMBLE COVERS AS SHOWN TO OBTAIN VALVE ACTION DESIRED.

TYPE 1	TYPE 2	TYPE 3	TYPE 4
RT SERIES BACK PRESSURE VALVE RCT SERIES- COUNTERBALANCE VALVE DIRECTLY CONTROLLED INTERNAL DRAIN	RT OR RCT SERIES- SEQUENCE VALVES DIRECTLY CONTROLLED EXTERNAL DRAIN	RT OR RCT SERIES- SEQUENCE VALVES REMOTELY CONTROLLED EXTERNAL DRAIN	RT SERIES- UNLOADING VALVE RCT SERIES- COUNTERBALANCE VALVE REMOTELY CONTROLLED INTERNAL DRAIN
<p>PLUGGED</p> <p>PLUGGED "P" CONTROL CONNECTION</p>	<p>271344 PLUG</p> <p>CONNECT TO TANK</p> <p>PLUGGED "P" CONTROL CONNECTION</p>	<p>271344 PLUG</p> <p>CONNECT TO TANK</p> <p>"P" CONTROL CONNECTION</p> <p>REMOTE CONTROL CONNECTION</p>	<p>271344 PLUG</p> <p>PLUGGED</p> <p>"P" CONTROL CONNECTION</p> <p>REMOTE CONTROL CONNECTION</p>

For satisfactory service life of these components, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from Vickers OFP, OFR, and OFRS series are recommended.

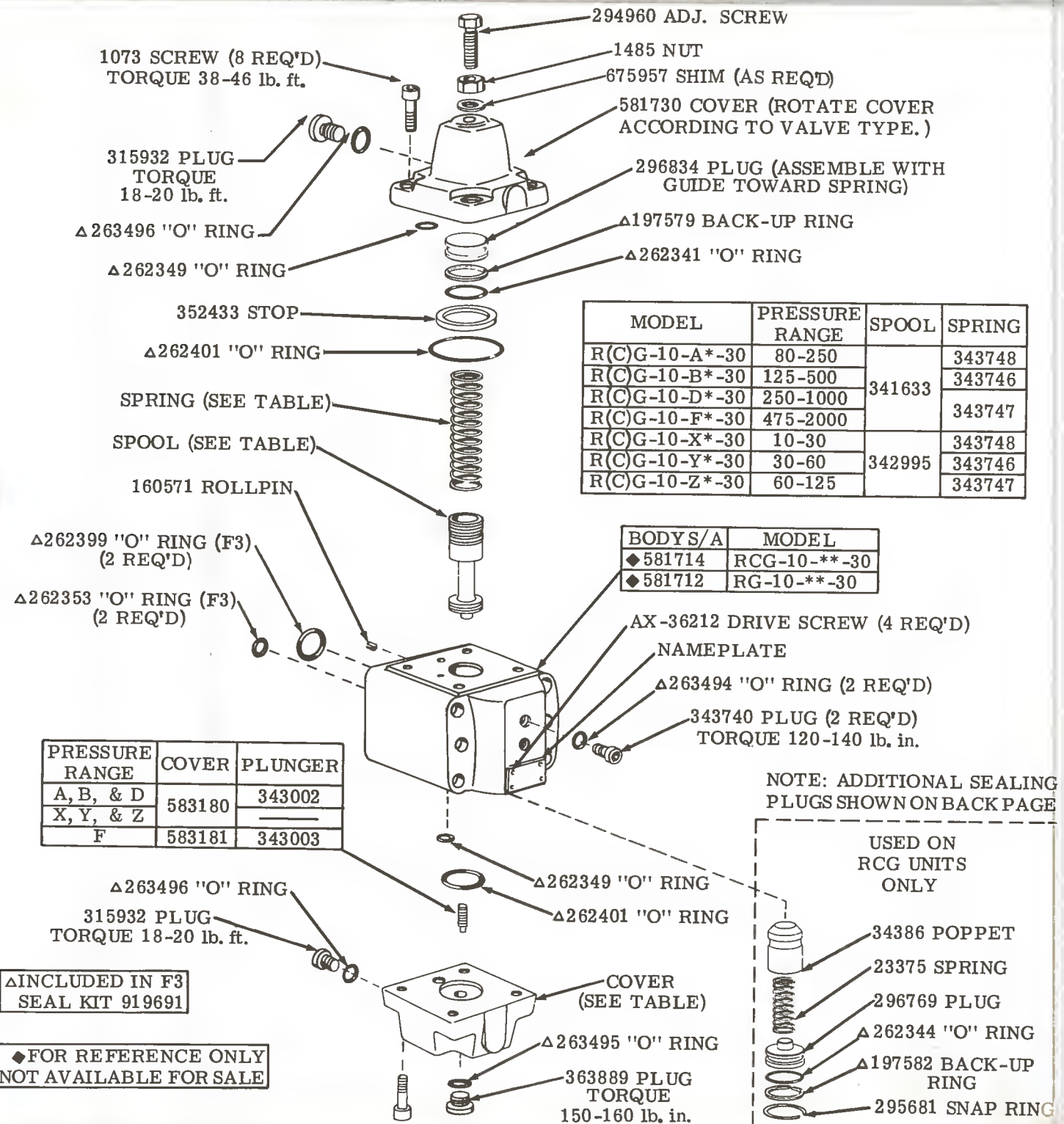
Litho in U. S. A.

Service Parts Information

PRESSURE CONTROL VALVES

(F3)R(C)G-10-**-30

VICKERS
A TRIMONA COMPANY



Vickers, Incorporated
P.O. Box 302
Troy, Michigan 48007-0302

Revised 11-1-85

I-3659-S

MODEL CODE BREAKDOWN

(F3)-R(C)G-10-**-3*

SPECIAL SEALS
(OMIT FOR STD
MODELS)

PRESSURE
CONTROL VALVE

"C" - WITH INTEGRAL CHECK VALVE
(REVERSE FREE FLOW)
OMITTED - WITHOUT CHECK VALVE

MOUNTING
MANIFOLD OR
SUBPLATE

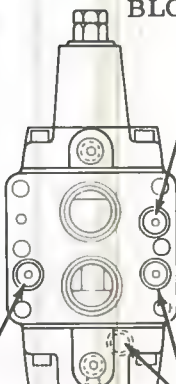
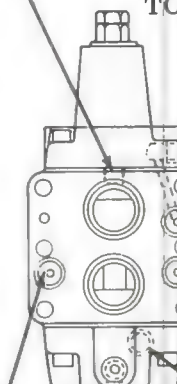
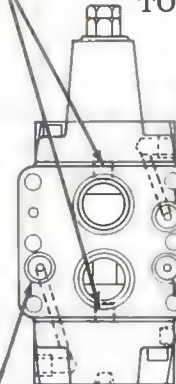
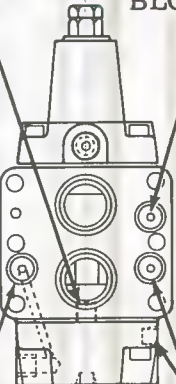
NOMINAL VALVE SIZE
10 - 1 1/4 INCH

DESIGN

VALVE TYPES
(INSET VIEWS AT BOTTOM
OF PAGE SHOW COVER
POSITIONS FOR THE (4)
VALVE TYPES)

PRESSURE RANGE
A - 80-250 PSI
B - 125-500 PSI
D - 250-1000 PSI
F - 475-2000 PSI
X - 10-30 PSI
Y - 30-60 PSI
Z - 60-125 PSI

NOTE: ASSEMBLE COVER AND PLUGS AS SHOWN TO OBTAIN VALVE ACTION DESIRED.

TYPE 1	TYPE 2	TYPE 3	TYPE 4
RG SERIES - BACK PRESSURE VALVE RCG SERIES - COUNTERBALANCE VALVE DIRECTLY CONTROLLED INTERNAL DRAIN	RG OR RCG SERIES - SEQUENCE VALVES DIRECTLY CONTROLLED EXTERNAL DRAIN	RG OR RCG SERIES - SEQUENCE VALVES REMOTELY CONTROLLED EXTERNAL DRAIN	RG SERIES - UNLOADING VALVE RCG SERIES - COUNTERBALANCE VALVE REMOTELY CONTROLLED INTERNAL DRAIN
 <p>DRAIN IS BLOCKED</p> <p>REMOTE "P" CONTROL CONTROL CONNECTION IS BLOCKED</p>	 <p>Δ271344 PLUG</p> <p>CONNECT TO TANK</p> <p>REMOTE "P" CONTROL CONTROL CONNECTION IS BLOCKED</p>	 <p>Δ271344 PLUG</p> <p>CONNECT TO TANK</p> <p>REMOTE "P" CONTROL CONTROL CONNECTION</p>	 <p>Δ271344 PLUG</p> <p>DRAIN IS BLOCKED</p> <p>REMOTE "P" CONTROL CONTROL CONNECTION</p>

For satisfactory service life of these components, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from Vickers OFFP, OFR, and OFRS series are recommended.

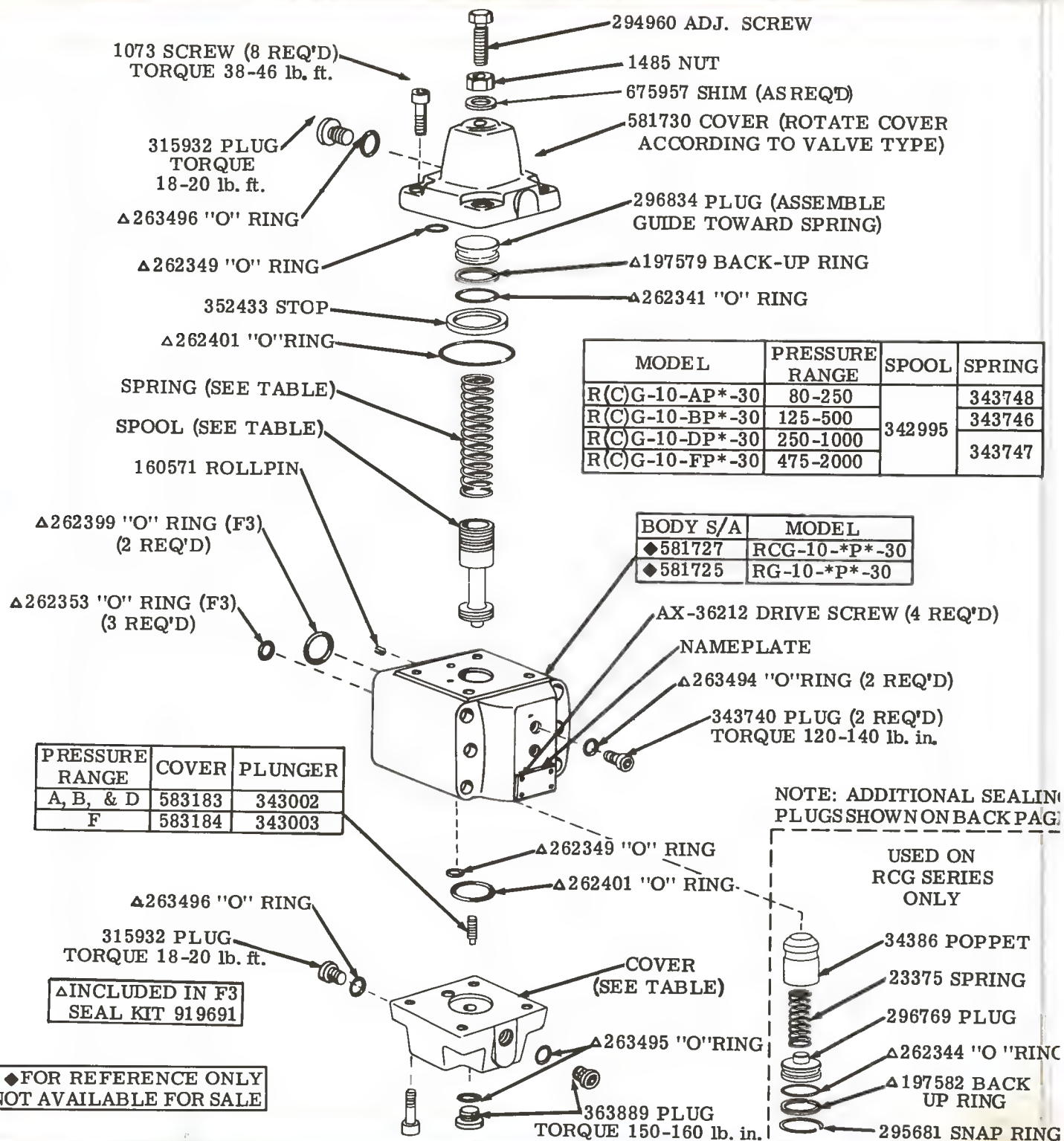
Litho in U. S. A.

Service Parts Information

VICKERS
A TRIMONA COMPANY

PRESSURE CONTROL VALVES

R(C)G-10-*P*-30



◆FOR REFERENCE ONLY
NOT AVAILABLE FOR SALE

Vickers, Incorporated
P.O. Box 302
Troy, Michigan 48007-0302

Revised 11-1-85

I-3660-S

MODEL CODE BREAKDOWN

(F3)- R (C) G-10-*P*-2*

SPECIAL SEALS
(OMIT FOR
STD. MODELS)

PRESSURE
CONTROL VALVE

"C" - WITH INTEGRAL CHECK VALVE
(REVERSE FREE FLOW)
OMITTED - WITHOUT CHECK VALVE

MOUNTING
MANIFOLD OR
SUBPLATE

NOMINAL VALVE
10 - 1 1/4"

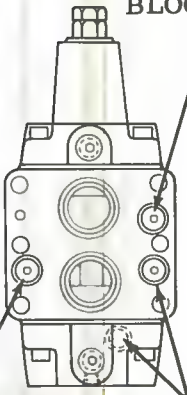
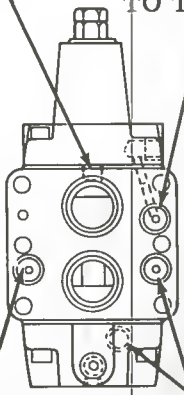
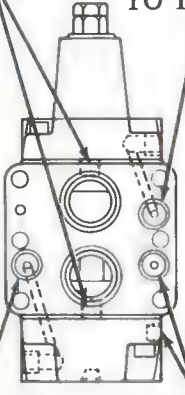
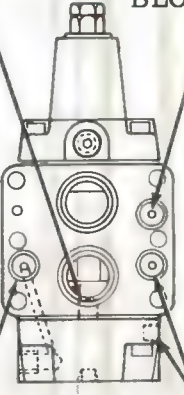
DESIGN

VALVE TYPES
(INSET VIEWS AT BOTTOM
OF PAGE SHOW COVER
POSITIONS FOR THE (4)
VALVE TYPES)

AUXILIARY REMOTE PRESSURE
CONTROL CONNECTION

PRESSURE RANGE
A - 80-250 PSI
B - 125-500 PSI
D - 250-1000 PSI
F - 475-2000 PSI

NOTE: ASSEMBLE COVER AND PLUGS AS SHOWN TO OBTAIN VALVE ACTION DESIRED.

TYPE 1	TYPE 2	TYPE 3	TYPE 4
RG SERIES- BACK PRESSURE VALVE RCG SERIES- COUNTERBALANCE VALVE DIRECTLY CONTROLLED INTERNAL DRAIN	RG OR RCG SERIES- SEQUENCE VALVES DIRECTLY CONTROLLED EXTERNAL DRAIN	RG OR RCG SERIES- SEQUENCE VALVES REMOTELY CONTROLLED EXTERNAL DRAIN	RG SERIES- UNLOADING VALVE RCG SERIES- COUNTERBALANCE VALVE REMOTELY CONTROLLED INTERNAL DRAIN
 <p>DRAIN IS BLOCKED</p> <p>REMOTE "P" CONTROL CONTROL CONNECTION IS BLOCKED</p>	 <p>Δ271344 PLUG</p> <p>CONNECT TO TANK</p> <p>REMOTE "P" CONTROL CONTROL CONNECTION IS BLOCKED</p>	 <p>Δ271344 PLUG</p> <p>CONNECT TO TANK</p> <p>REMOTE "P" CONTROL CONTROL CONNECTION CONNECTION</p>	 <p>Δ271344 PLUG</p> <p>DRAIN IS BLOCKED</p> <p>REMOTE "P" CONTROL CONTROL CONNECTION CONNECTION</p>

For satisfactory service life of these components, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from Vickers OFF, OFR, and OFRS series are recommended.

Litho in U. S. A.

Service Parts Information

PRESSURE CONTROL VALVES

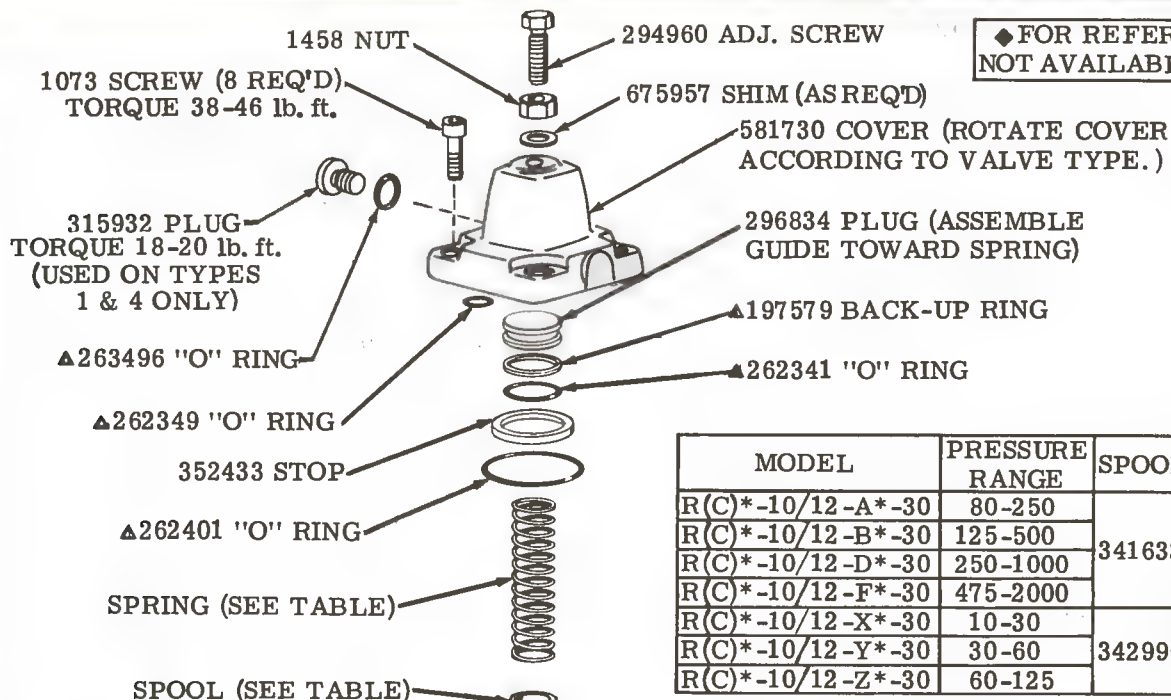
R(C)T-10/12-**-30

R(C)S-10/12-**-30

VICKERS

A TRIMONA COMPANY

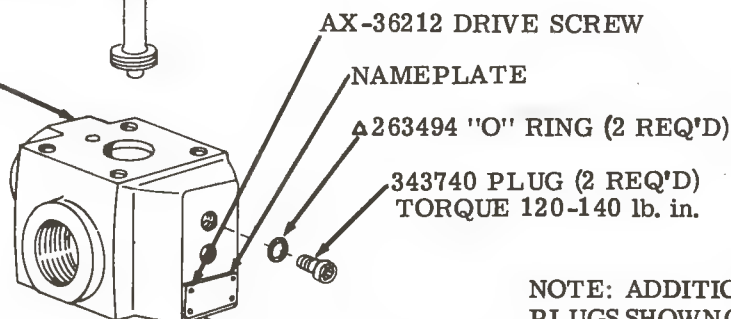
◆ FOR REFERENCE ONLY
NOT AVAILABLE FOR SALE



MODEL	PRESSURE RANGE	SPOOL	SPRING
R(C)*-10/12-A*-30	80-250	341633	343748
R(C)*-10/12-B*-30	125-500		343746
R(C)*-10/12-D*-30	250-1000		343747
R(C)*-10/12-F*-30	475-2000	342995	343748
R(C)*-10/12-X*-30	10-30		343746
R(C)*-10/12-Y*-30	30-60		343747
R(C)*-10/12-Z*-30	60-125		

BODY S/A	MODEL
◆590354	RCS-10-**-30
◆590368	RS-10-**-30
◆590356	RCS-12-**-30
◆590369	RS-12-**-30
◆590359	RCT-10-**-30
◆590371	RT-10-**-30
◆590362	RCT-12-**-30
◆590372	RT-12-**-30

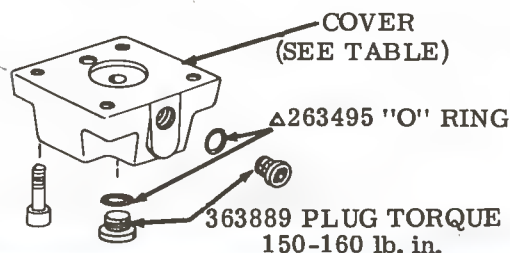
PRESSURE RANGE	COVER	PLUNGER
A, B, & D	583180	343002
X, Y, & Z		—
F	583181	343003



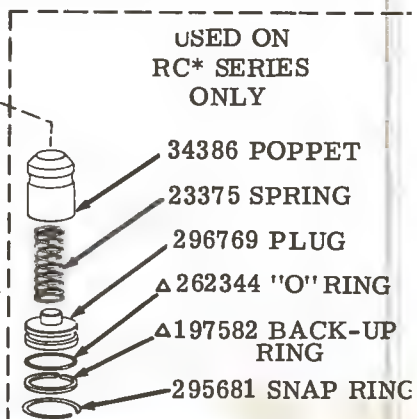
NOTE: ADDITIONAL SEALING
PLUGS SHOWN ON BACK PAGE

315932 PLUG
TORQUE 18-20 lb. ft.

▲263496 "O" RING



▲INCLUDED IN F3
SEAL KIT 919618



Vickers, Incorporated
P.O. Box 302
Troy, Michigan 48007-0302

Revised 11-1-85

I-3661-S

MODEL CODE BREAKDOWN

F3 - R (C) T - ** - ** -3*

SPECIAL SEALS

PRESSURE
CONTROL VALVE

"C" - WITH INTEGRAL CHECK VALVE
(REVERSE FREE FLOW)
OMITTED - WITHOUT CHECK VALVE

THREADED CONNECTIONS
S - STRAIGHT THREADS
T - NPTF THREADS

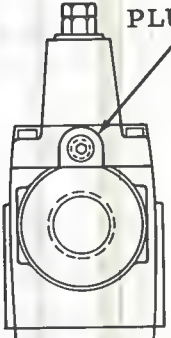
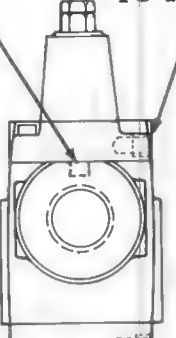
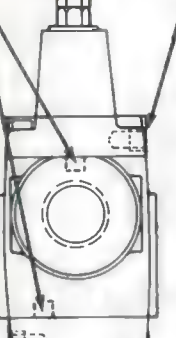
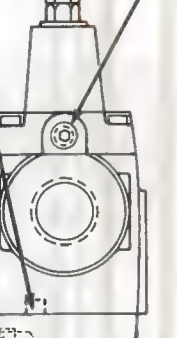
NOMINAL VALVE SIZE
10 - S - 1.6250-12 UN-2B THD
T - 1 $\frac{1}{4}$ NPTF THREAD
12 - S - 1.8750-12 UN-2B THD
T - 1 $\frac{1}{2}$ NPTF THREAD

DESIGN

VALVE TYPES
(INSET VIEWS AT BOTTOM
OF PAGE SHOW COVER
POSITIONS FOR THE (4)
VALVE TYPES)

PRESSURE RANGE
A - 80-250 PSI
B - 125-500 PSI
D - 250-1000 PSI
F - 475-2000 PSI
X - 10-30 PSI
Y - 30-60 PSI
Z - 60-125 PSI

NOTE: ASSEMBLE COVER AND PLUGS AS SHOWN TO OBTAIN VALVE ACTION DESIRED.

TYPE 1	TYPE 2	TYPE 3	TYPE 4
RT SERIES- BACK PRESSURE VALVE RCT SERIES- COUNTERBALANCE VALVE DIRECTLY CONTROL- LED INTERNAL DRAIN	RT OR RCT SERIES- SEQUENCE VALVES DIRECTLY CONTROLLED EXTERNAL DRAIN	RT OR RCT SERIES- SEQUENCE VALVES REMOTELY CONTROLLED EXTERNAL DRAIN	RT SERIES- UNLOADING VALVE RCT SERIES- COUNTERBALANCE VALVE REMOTELY CONTROL- LED INTERNAL DRAIN
 <p>PLUGGED</p> <p>"P" CONTROL CONNECTION PLUGGED</p>	 <p>Δ271344 PLUG</p> <p>CONNECT TO TANK</p> <p>"P" CONTROL CONNECTION PLUGGED</p>	 <p>Δ 271344 PLUG</p> <p>CONNECT TO TANK</p> <p>"P" CONTROL CONNECTION</p> <p>REMOTE CONTROL CONNECTION</p>	 <p>Δ271344 PLUG</p> <p>PLUGGED</p> <p>"P" CONTROL/REMOTE CONNECTION CONTROL CONNECTION</p>

For satisfactory service life of these components, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from Vickers OFP, OFR, and OFRS series are recommended.

Litho in U. S. A.

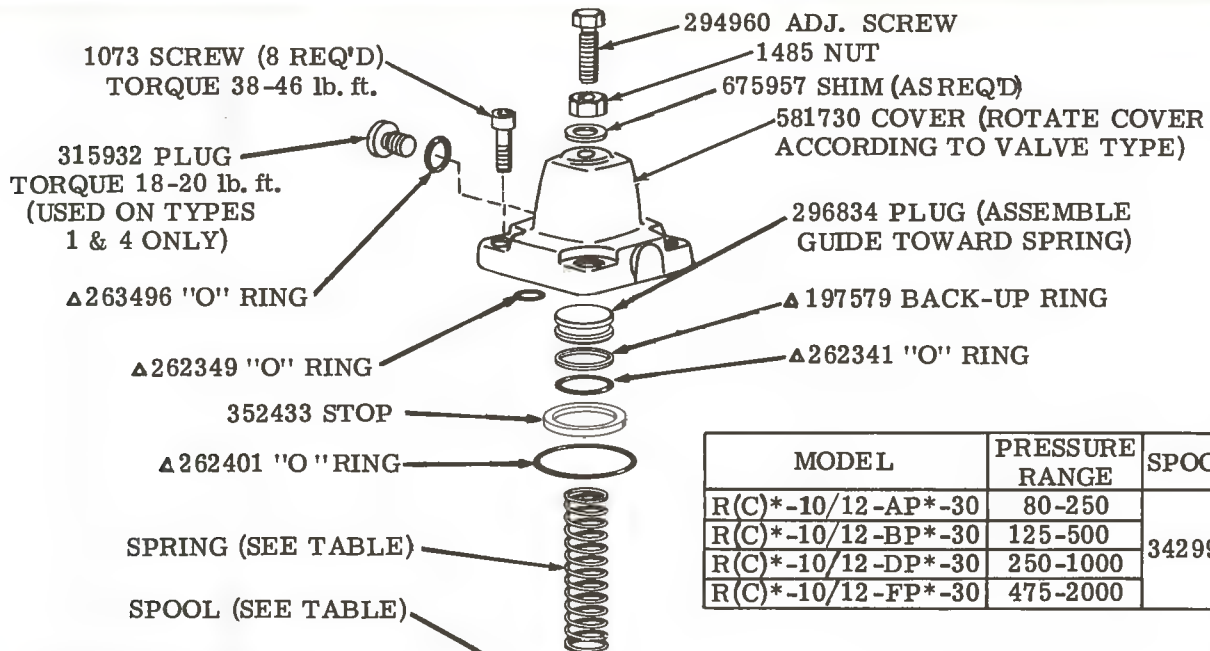
Service Parts Information

PRESSURE CONTROL VALVES

R(C)T-10/12-*P*-30

R(C)S-10/12-*P*-30

VICKERS
A TRIMMOVA COMPANY



MODEL	PRESSURE RANGE	SPOOL	SPRING
R(C)*-10/12-AP*-30	80-250	342995	343748
R(C)*-10/12-BP*-30	125-500		343746
R(C)*-10/12-DP*-30	250-1000		343747
R(C)*-10/12-FP*-30	475-2000		

BODY S/A	MODEL
◆ 590354	RCS-10-*P*-30
◆ 590368	RS-10-*P*-30
◆ 590356	RCS-12-*P*-30
◆ 590369	RS-12-*P*-30
◆ 590359	RCT-10-*P*-30
◆ 590371	RT-10-*P*-30
◆ 590362	RCT-12-*P*-30
◆ 590372	RT-12-*P*-30

NOTE: ADDITIONAL SEALING PLUGS SHOWN ON BACK PAGE

PRESSURE RANGE	COVER	PLUNGER
A, B, & D	583182	343002
F	583185	343003



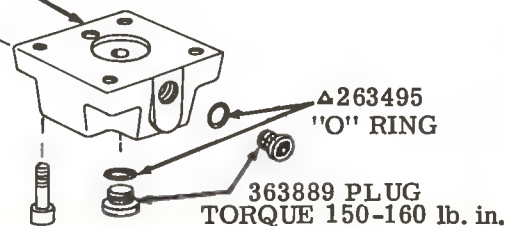
◆ FOR REFERENCE ONLY
NOT AVAILABLE FOR SALE

COVER (SEE TABLE)

315932 PLUG
TORQUE 18-20 lb. ft.
(USED ON TYPES
1 & 2 ONLY)

Δ263496 'O' RING

Δ INCLUDED IN F3
SEAL KIT 919618



USED ON
RC* SERIES
ONLY

Vickers, Incorporated
P.O. Box 302
Troy, Michigan 48007-0302

Revised 11-1-85

I-3662-S

MODEL CODE BREAKDOWN

F3-R (C) T- ** - * P * -3*

SPECIAL SEALS

PRESSURE
CONTROL VALVE

"C" - WITH INTEGRAL CHECK VALVE
(REVERSE FREE FLOW)
OMITTED - WITHOUT CHECK VALVE

THREADED CONNECTIONS
S - STRAIGHT THREAD
T - NPTF THREAD

NOMINAL VALVE SIZE
10 - S - 1.625-12 UN-2B THREAD
FOR 1.25 O.D. TUBING
T - 1 1/4 NPTF
12 - S - 1.875-12 UN-2B THREAD
FOR 1.50 O.D. TUBING
T - 1 1/2 NPTF

DESIGN

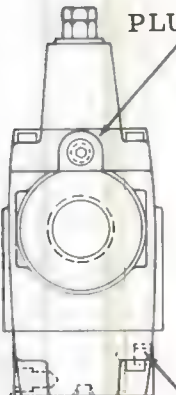
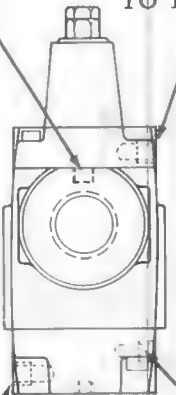
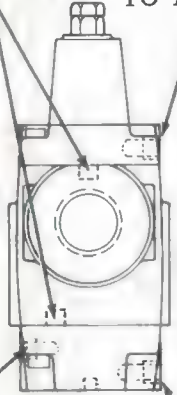
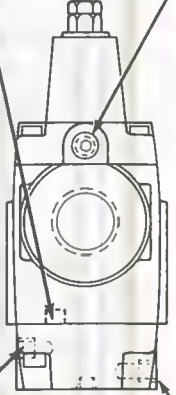
VALVE TYPES
(INSET VIEWS AT BOTTOM
OF PAGE SHOW COVER
POSITIONS FOR THE (4)
VALVE TYPES)

AUXILIARY REMOTE
CONTROL CONNECTION.

PRESSURE RANGE

A - 80 -250
B - 125 -500
D - 250 -1000
F - 475 -2000

NOTE: ASSEMBLE COVER AND PLUGS AS SHOWN TO OBTAIN VALVE ACTION DESIRED.

TYPE 1	TYPE 2	TYPE 3	TYPE 4
RT SERIES- BACK PRESSURE VALVE RCT SERIES- COUNTERBALANCE VALVE DIRECTLY CONTROL- LED INTERNAL DRAIN	RT OR RCT SERIES- SEQUENCE VALVES DIRECTLY CONTROLLED EXTERNAL DRAIN	RT OR RCT SERIES- SEQUENCE VALVES REMOTELY CONTROLLED EXTERNAL DRAIN	RT SERIES- UNLOADING VALVE RCT SERIES- COUNTERBALANCE VALVE REMOTELY CONTROL- LED INTERNAL DRAIN
 <p>PLUGGED</p> <p>"P" CONTROL CONNECTION PLUGGED</p>	 <p>Δ271344 PLUG</p> <p>CONNECT TO TANK</p> <p>"P" CONTROL CONNECTION</p>	 <p>Δ271344 PLUG</p> <p>CONNECT TO TANK</p> <p>"P" CONTROL CONNECTION</p> <p>REMOTE CONTROL CONNECTION</p>	 <p>Δ271344 PLUG</p> <p>PLUGGED</p> <p>"P" CONTROL CONNECTION</p> <p>REMOTE CONTROL CONNECTION</p>

For satisfactory service life of these components, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from Vickers OFP, OFR, and OFRS series are recommended.

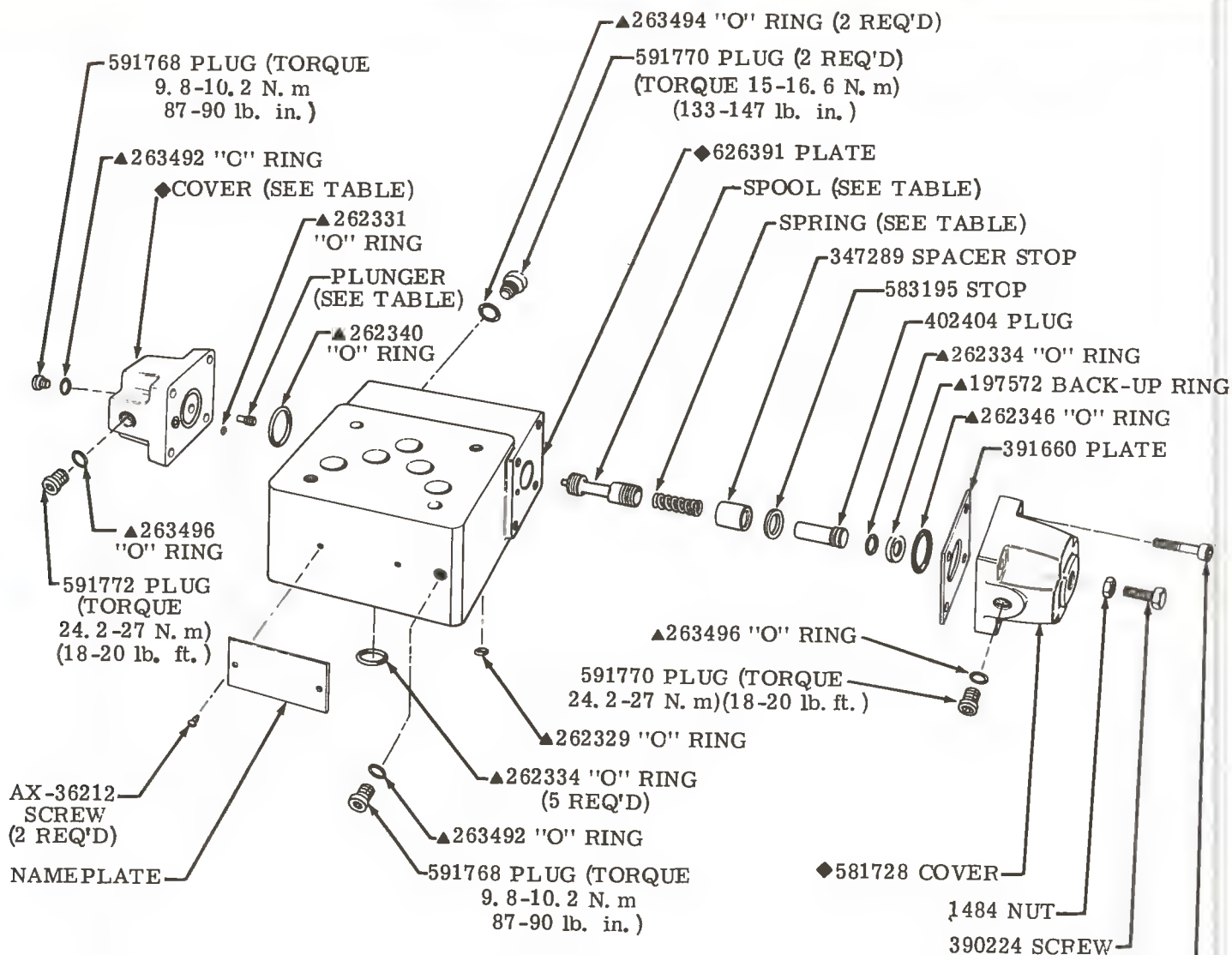
Litho in U. S. A.

Service Parts Information

MODULAR SEQUENCE VALVES

VICKERS
A TRIMONA COMPANY

(F3)DGR-01-*2-52



▲SERVICE ALL UNITS
W/F3 SEAL KIT 919894

◆NCT AVAILABLE
FOR SALE

NOTE
WHEN TWO OR MORE MODULES ARE ASSEMBLED TOGETHER, THIS MODULE MUST BE MOUNTED NEXT TO THE SUBPLATE OR MOUNTING SURFACE TO ACCOMMODATE THE EXTERNAL DRAIN ("Y" PORT).

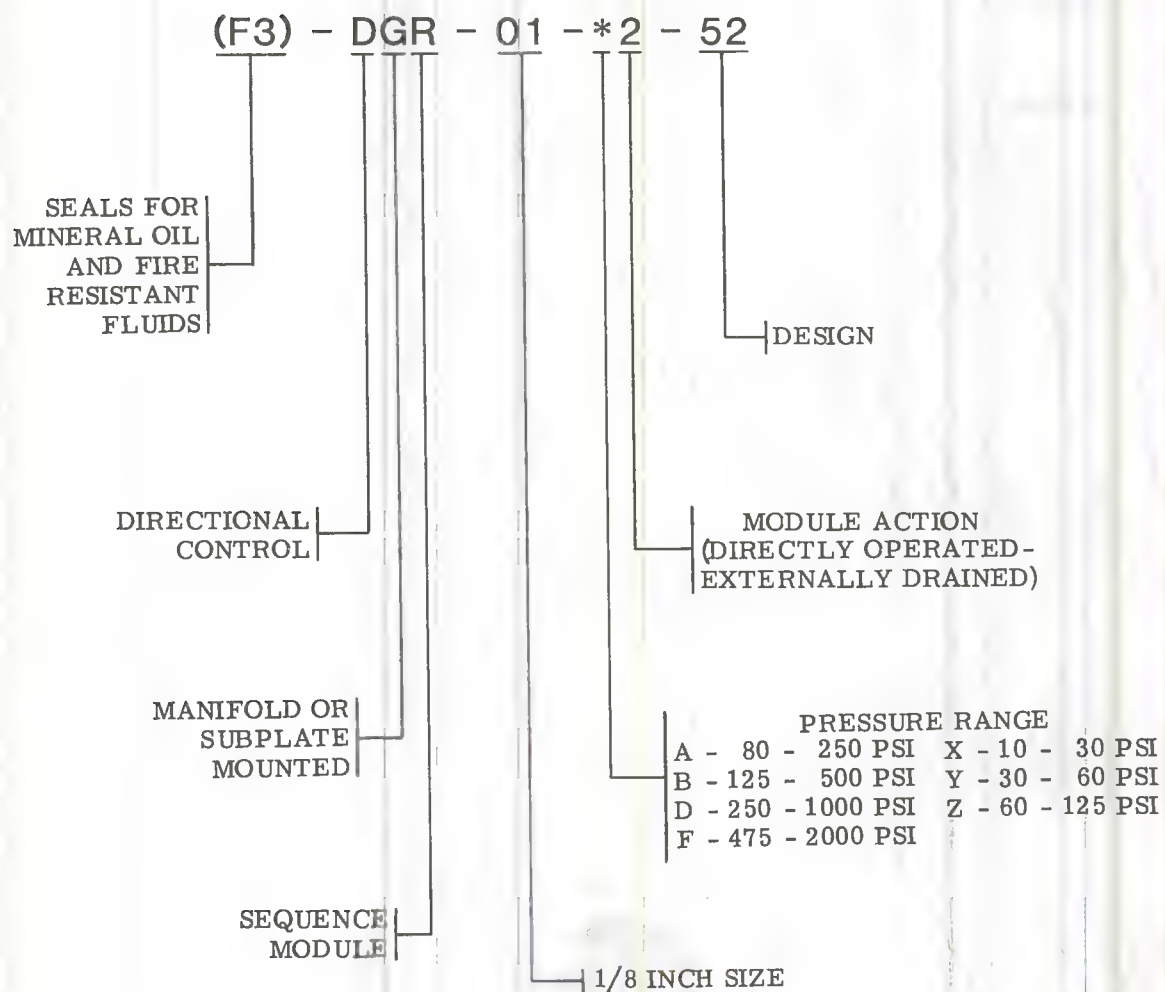
MODEL	COVER	PLUNGER	SPOOL	SPRING
DGR-01-A2-52				343087
DGR-01-B2-52	581732	593890	340287	343088
DGR-01-D2-52				343089
DGR-01-F2-52	581731	593891		343087
DGR-01-X2-52				343088
DGR-01-Y2-52	581732	—	340288	343089
DGR-01-Z2-52				343089

Vickers, Incorporated
P.O. Box 302
Troy, Michigan 48007-0302

Revised 8-1-85

I-3648-S

MODEL CODE BREAKDOWN



For satisfactory service life of these components in industrial applications, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from Vickers OFP, OFR, and OFRS series are recommended.

Litho in U. S. A.

Service Parts Information

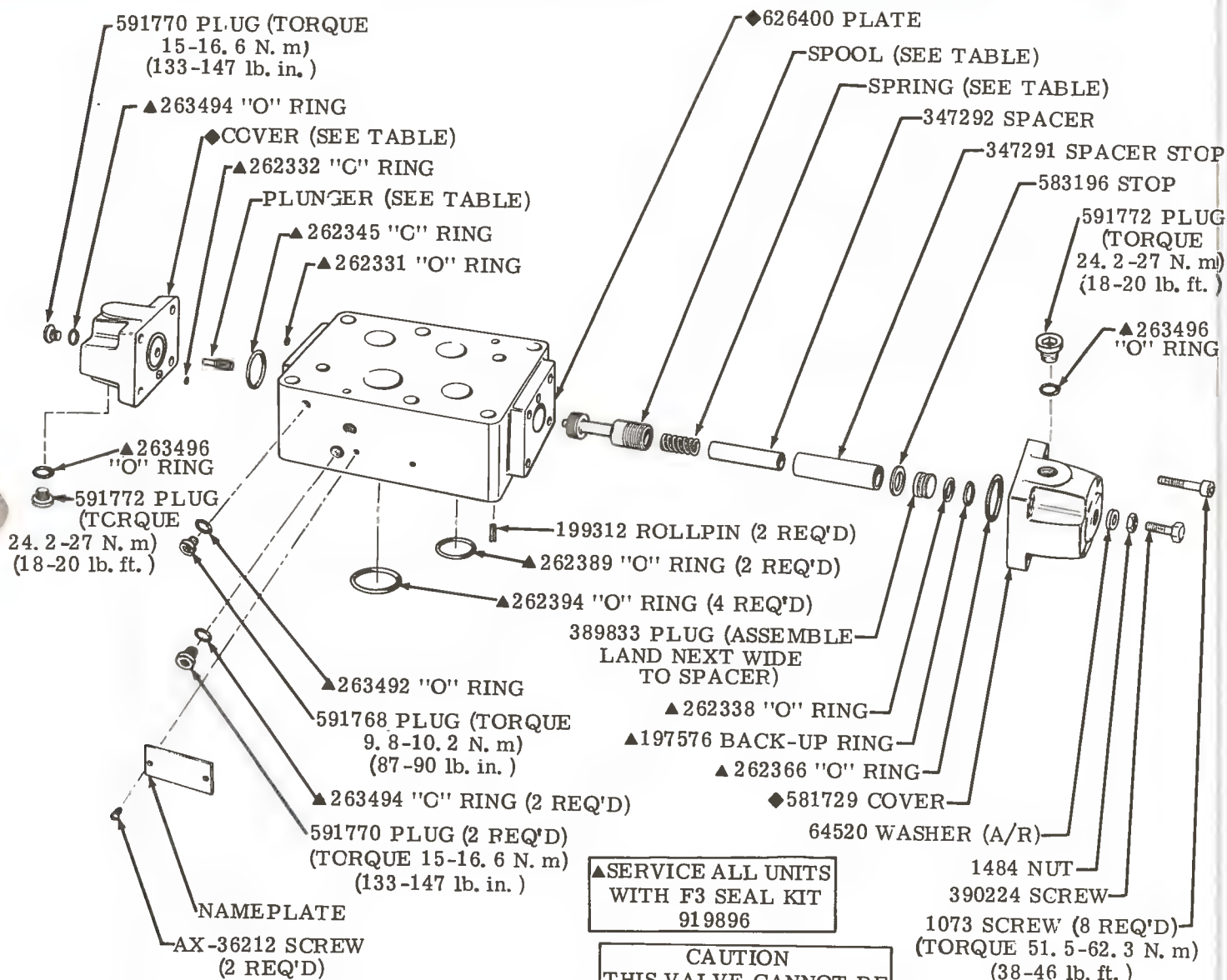
MODULAR SEQUENCE VALVES

DGR-06-*2-52

VICKERS

A TRIMONA COMPANY

◆NOT AVAILABLE FOR SALE



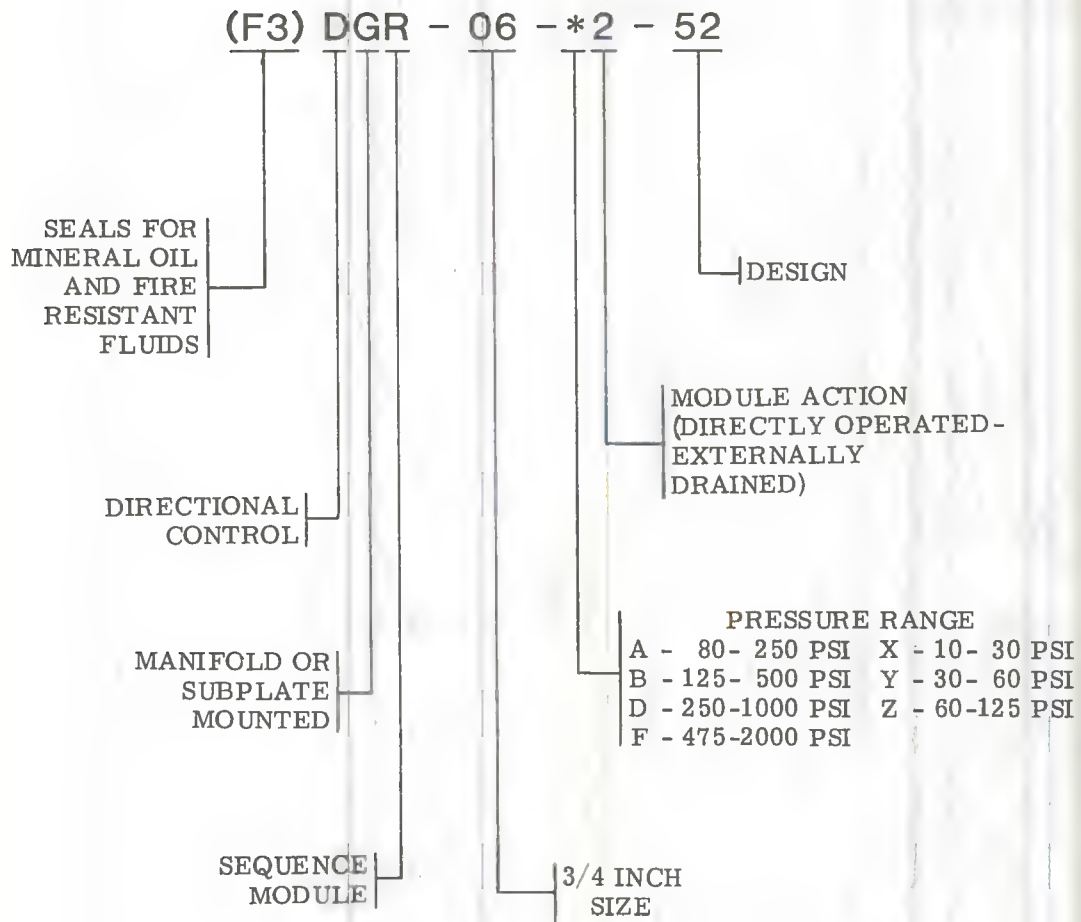
MODEL	COVER	PLUNGER	SPOOL	SPRING
DGR-06-A2-52				341612
DGR-06-B2-52	583190	593888	340305	342243
DGR-06-D2-52				342244
DGR-06-F2-52	583189	593889		341612
DGR-06-X2-52			340306	342243
DGR-06-Y2-52	583190	—		342244
DGR-06-Z2-52				342244

Vickers, Incorporated
P.O. Box 302
Troy, Michigan 48007-0302

Revised 8-1-85

I-3649-S

MODEL CODE BREAKDOWN



For satisfactory service life of these components in industrial applications, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from Vickers OFP, OFR, and OFRS series are recommended.

Litho in U. S. A.

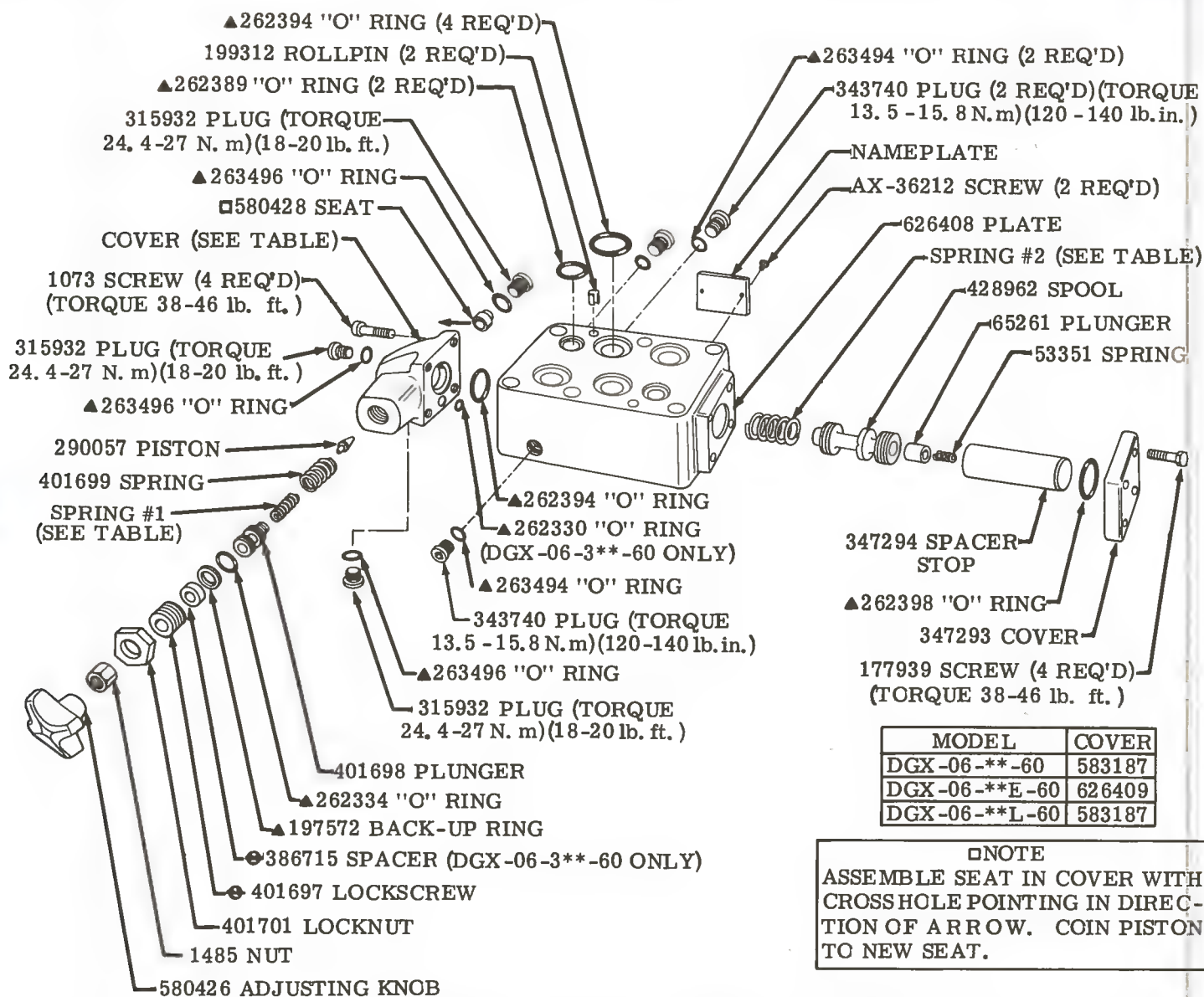
Service Parts Information

MODULAR PRESSURE REDUCING VALVES

(F3)DGX-06-**(*)-60

VICKERS

A TRIMONA COMPANY



MODEL	COVER
DGX-06-**-60	583187
DGX-06-**-E-60	626409
DGX-06-**-L-60	583187

□NOTE
ASSEMBLE SEAT IN COVER WITH CROSSHOLE POINTING IN DIRECTION OF ARROW. COIN PISTON TO NEW SEAT.

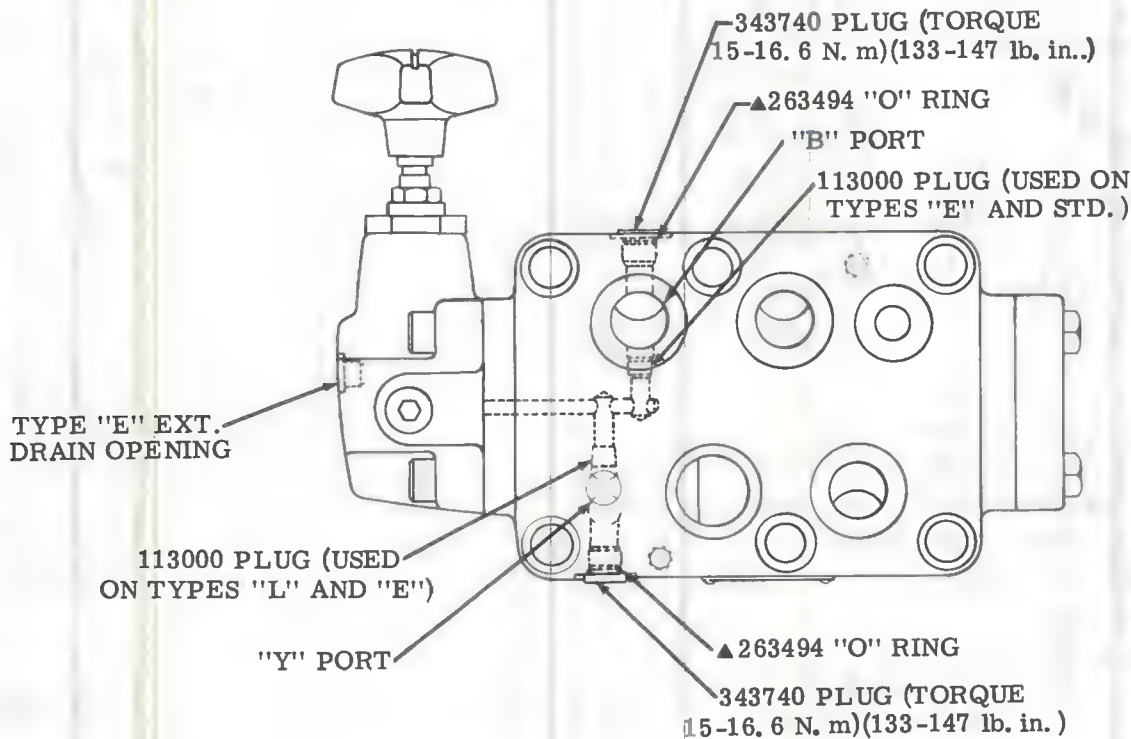
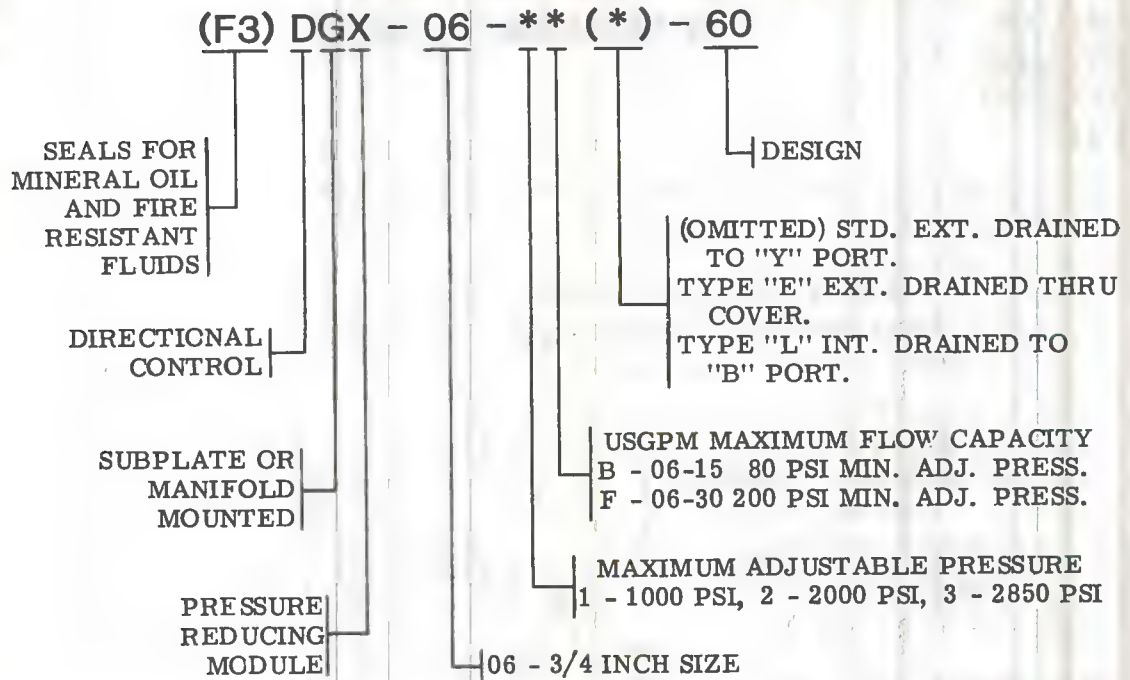
●ASSEMBLE 401697 LOCKSCREW WITH STEPPED O.D. END TOWARD 386715 SPACER OR PLUNGER.

▲SERVICE ALL UNITS
W/F3 SEAL KIT 920126

CAUTION
THIS VALVE CANNOT BE USED WITH
PRESSURE CENTERED VALVES.

MODEL	SPRING #1	SPRING #2
DGX-06-1**-60	2280	
DGX-06-2**-60	583937	
DGX-06-3**-60	401700	
DGX-06-*B*-60		322653
DGX-06-*F*-60		348614

MODEL CODE BREAKDOWN



To insure sustained efficiency and maximum trouble free life of this precision equipment, initial and continuous full flow filtration of the fluid medium is essential. Select and apply filters from the Vickers OFP, OFR, and OFRS series, which are available in 3, 10, and 25 micrometre filtration ratings.

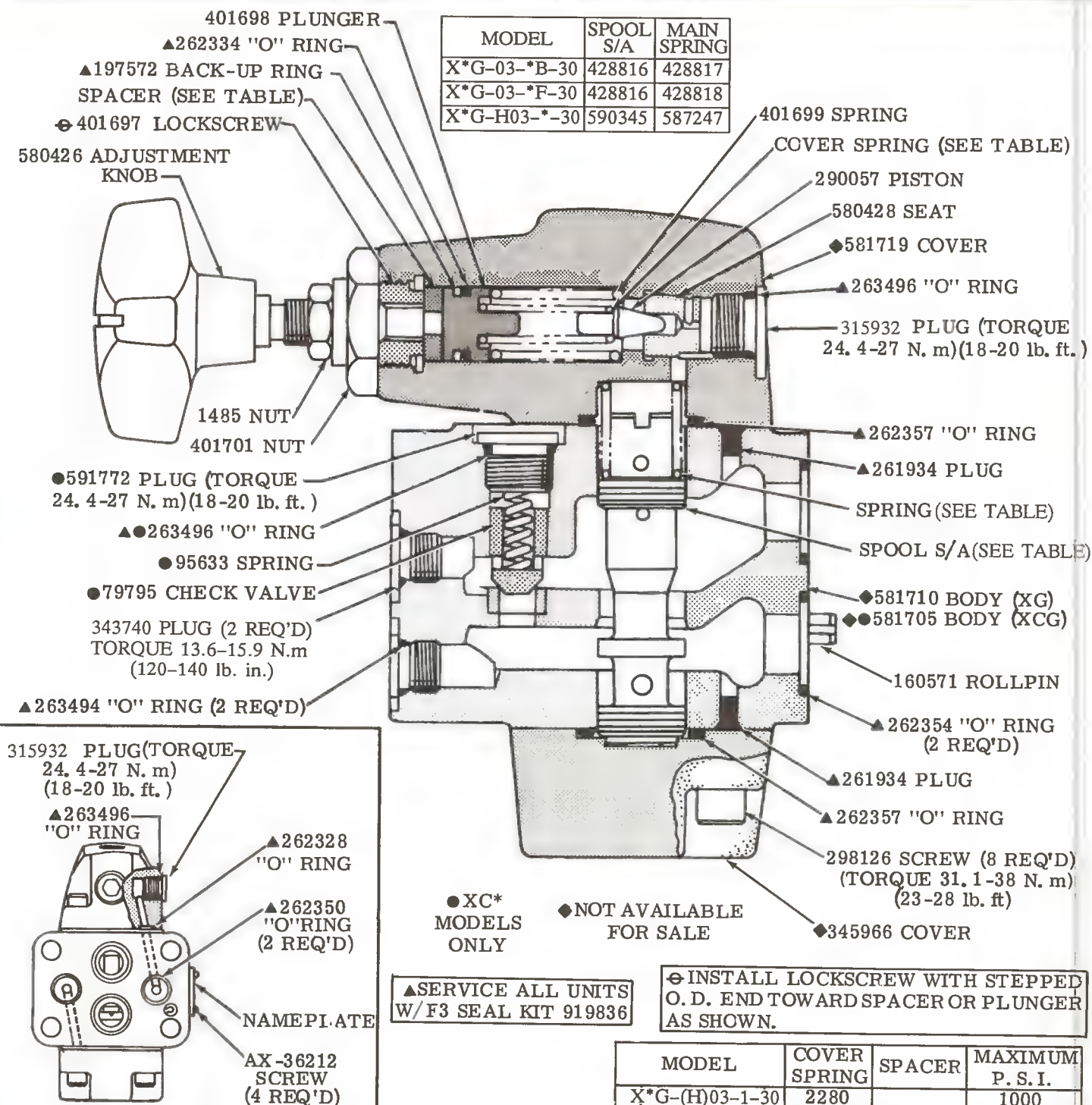
Service Parts Information

VICKERS

A TRIMONA COMPANY

PRESSURE REDUCING VALVES

X(C)G-(H)03-**-30



Vickers, Incorporated
P.O. Box 302
Troy, Michigan 48007-0302

Revised 12-1-87

I-3664-S

50 4

MODEL CODE BREAKDOWN

(F3) - X (C) G - (H) 03 - * * - 30

1 2 3 4 5 6 7 8 9

1 Seals For Mineral Oil
& Fire Resistant Fluids

2 Pressure Reducing Valve

3 Integral Check Valve
(Omit if not Required)

4 Manifold or Subplate Mounted

5 Rated Flow - 30 USGPM
(Omit for 'B' & 'F' Models)

6 Nominal Valve Size - 3/8 Inch

7 Maximum Adjustable Pressure

1 - 1000 PSI
2 - 2000 PSI
3 - 2850 PSI

8 Rated Flow
(Omit for High Flow 'H' Models)

B - 7 USGPM
F - 14 USGPM

9 Design

For satisfactory service life of these components in industrial applications, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from OFP, OFR, and OFRS series filters are recommended.

Litho in U.S.A.

Service Parts Information

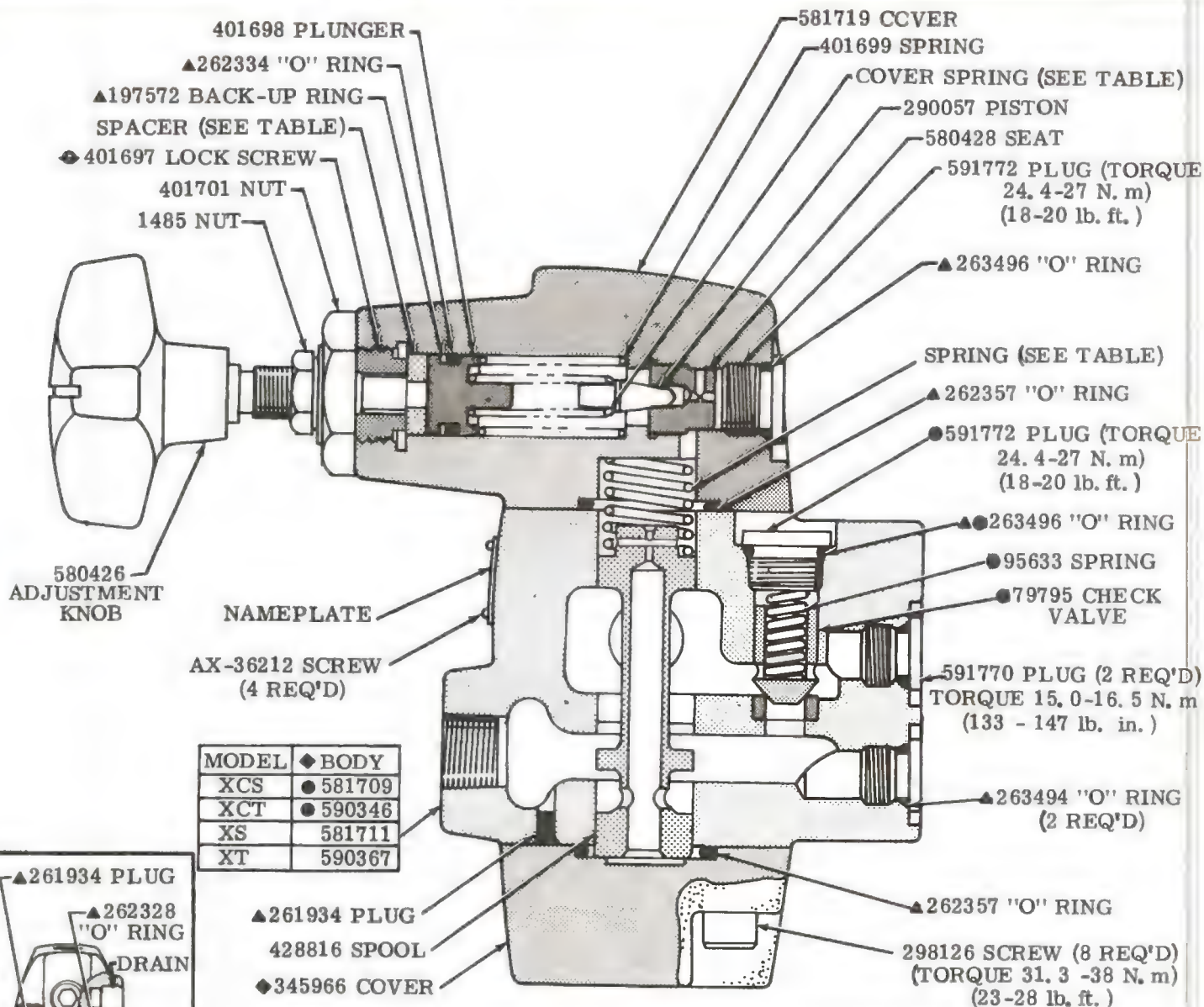
PRESSURE REDUCING VALVES

X(C)T-03-**-30

X(C)S-03-**-30

VICKERS

A TRIMBOVA COMPANY



MODEL	◆ BODY
XCS	● 581709
XCT	● 590346
XS	581711
XT	590367

▲SERVICE ALL UNITS
W/F3 SEAL KIT 919836

◆INSTALL LOCKSCREW WITH STEPPED
O. D. END TOWARD SPACER OR PLUNGER
AS SHOWN.

●FOR XCS & XCT
MODELS ONLY

◆NOT
AVAILABLE
FOR SALE

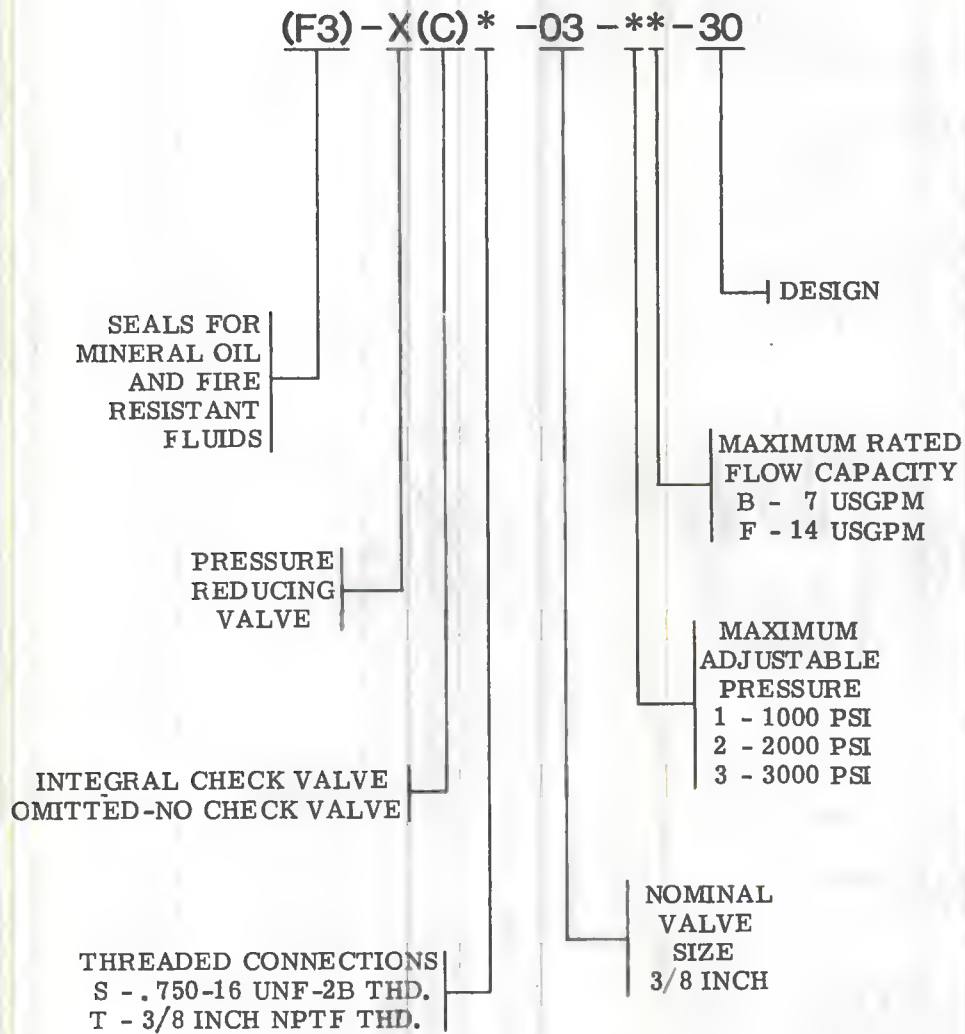
MODEL	SPRING	COVER SPRING	SPACER	PRESSURE RANGE PSI	RATED FLOW USGPM
X(C)*-03-1B-30	428817	2280		75-1000	7
X(C)*-03-1F-30	428818			150-1000	14
X(C)*-03-2B-30	428817	583937		75-2000	7
X(C)*-03-2F-30	428818			150-2000	
X(C)*-03-3F-30		401700	386715	150-2850	14

Vickers, Incorporated
P.O. Box 302
Troy, Michigan 48007-0302

Revised 3-1-85

I-3665-S

MODEL CODE BREAKDOWN



To insure sustained efficiency and maximum trouble free life of this precision equipment, initial and continuous full flow filtration of the fluid medium is essential. Select and apply filters from the Vickers OFP, OFR, and OFRS series, which are available in 3, 10, and 25 micrometre filtration ratings.

Service Parts Information

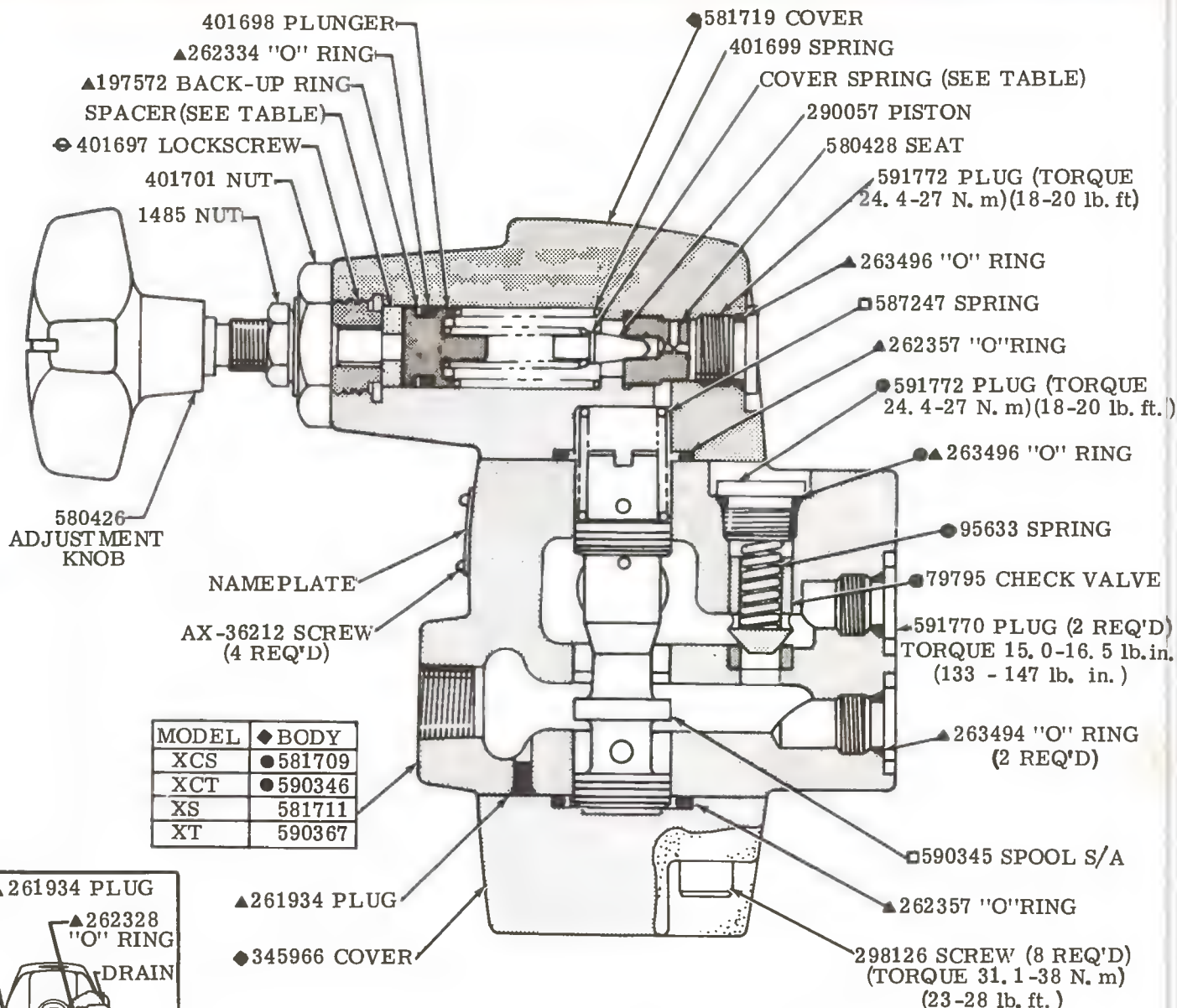
VICKERS

A TRIMOVA COMPANY

PRESSURE REDUCING VALVES

X(C)T-H03-*-30

X(C)S-H03-*-30



MODEL	◆ BODY
XCS	●581709
XCT	●590346
XS	581711
XT	590367

NOTE

INSTALL LOCKSCREW WITH STEPPED O.D. END TOWARD SPACER OR PLUNGER AS SHOWN.

●FOR XC*
MODEL ONLY

◆NOT AVAILABLE
FOR SALE

▲SERVICE ALL UNITS
W/ F3 SEAL KIT 919836

□INCLUDED IN SPOOL
S/A KIT 941389

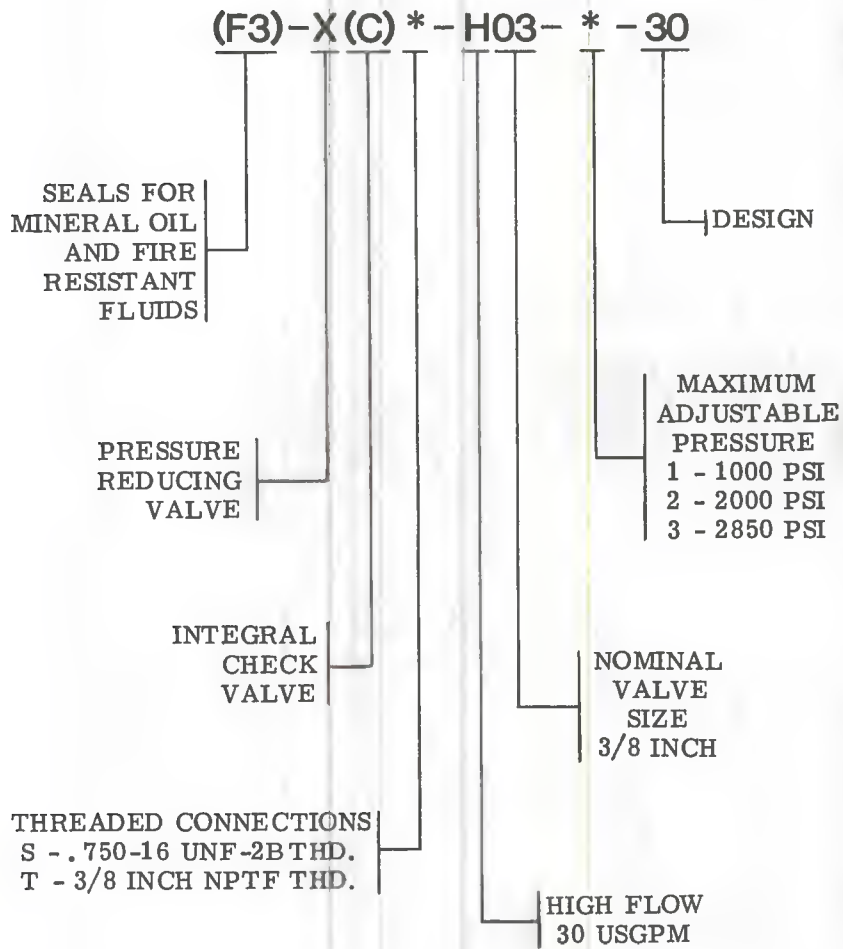
MODEL	COVER SPRING	SPACER	MAXIMUM P. S. I.
X(C)*-H03-1-30	2280		1000
X(C)*-H03-2-30	583937		2000
X(C)*-H03-3-30	401700	386715	2850

Vickers, Incorporated
P.O. Box 302
Troy, Michigan 48007-0302

Revised 8-1-87

I-3666-S

MODEL CODE BREAKDOWN



For satisfactory service life of these components in industrial applications, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from Vickers OFP, CFR, and OFRS series are recommended.

Litho in U. S. A.

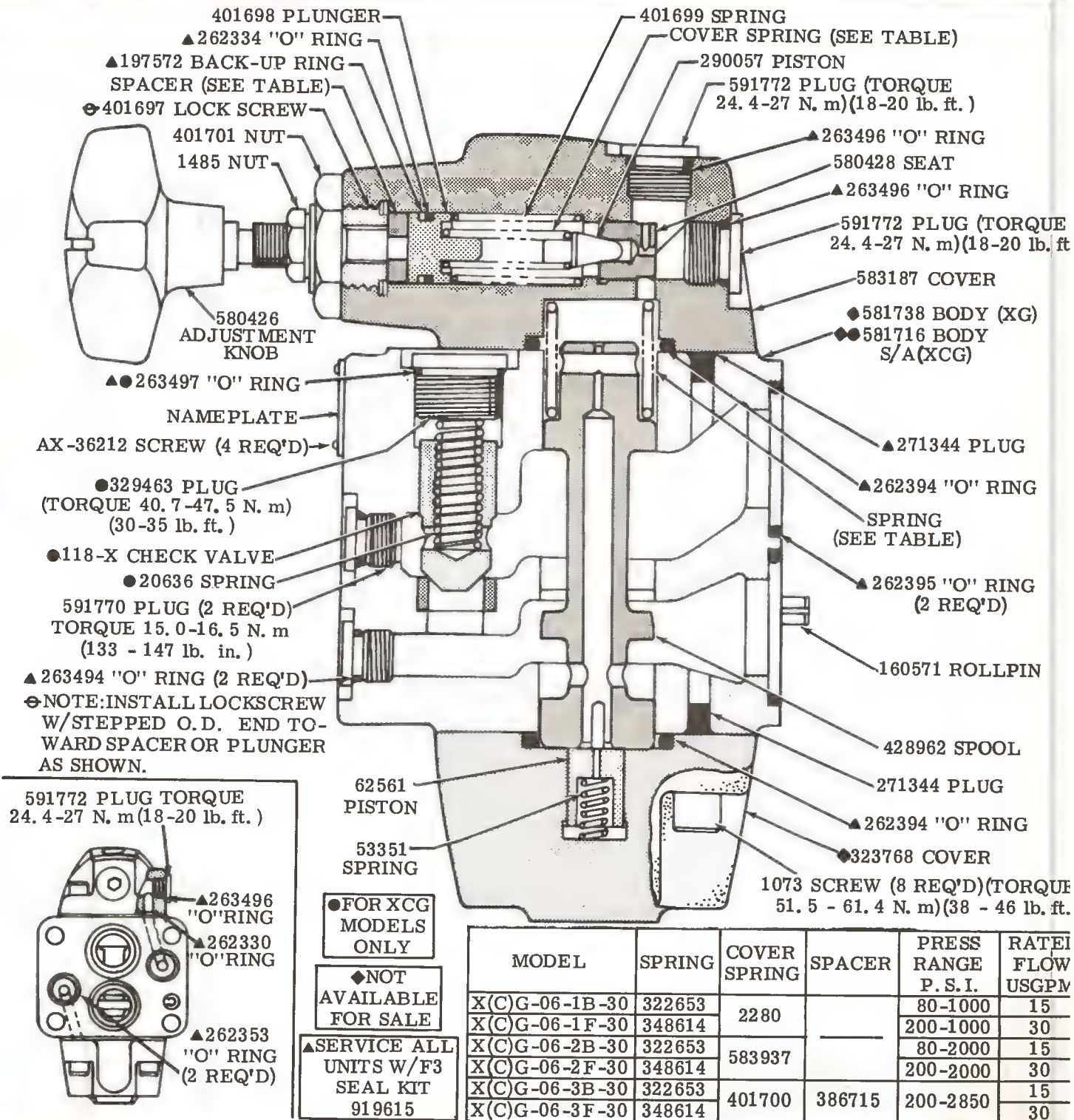
Service Parts Information

VICKERS

A TRIMONA COMPANY

PRESSURE REDUCING VALVES

X(C)G-06--30**

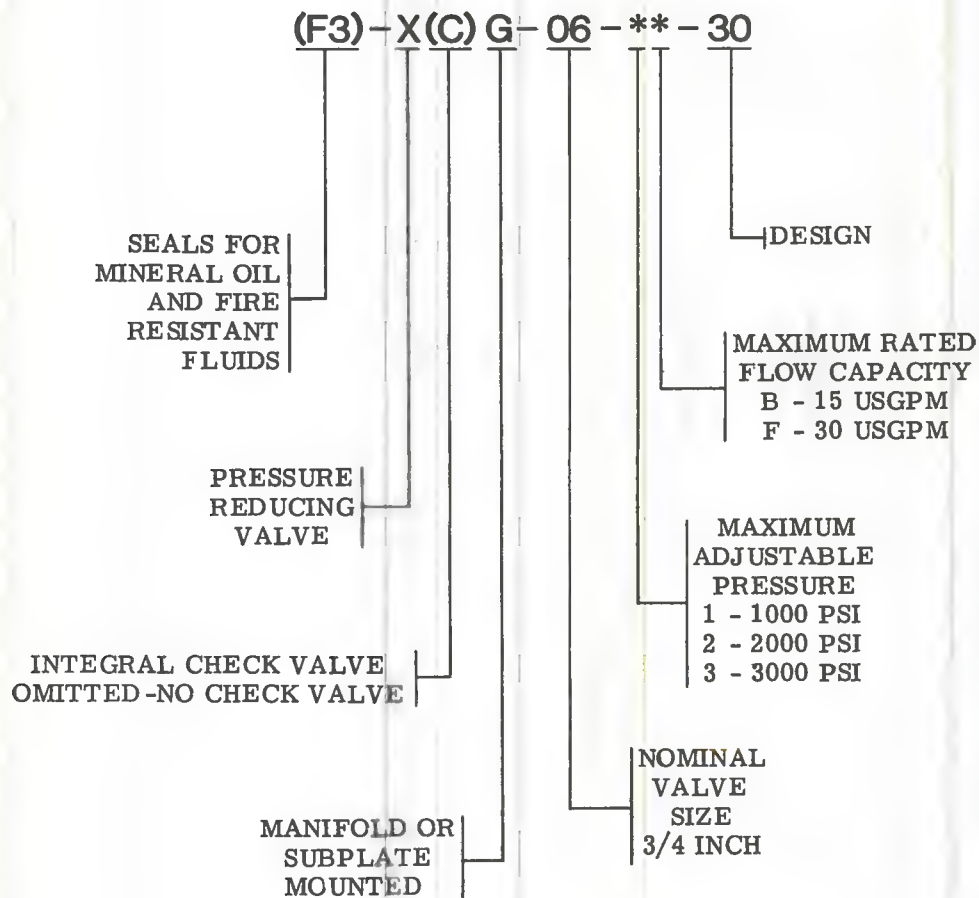


Vickers, Incorporated
P.O. Box 302
Troy, Michigan 48007-0302

Revised 3-1-85

I-3667-S

MODEL CODE BREAKDOWN



To insure sustained efficiency and maximum trouble free life of this precision equipment, initial and continuous full flow filtration of the fluid medium is essential. Select and apply filters from the Vickers OFP, OFR, and OFRS series, which are available in 3, 10, and 25 micrometre filtration ratings.

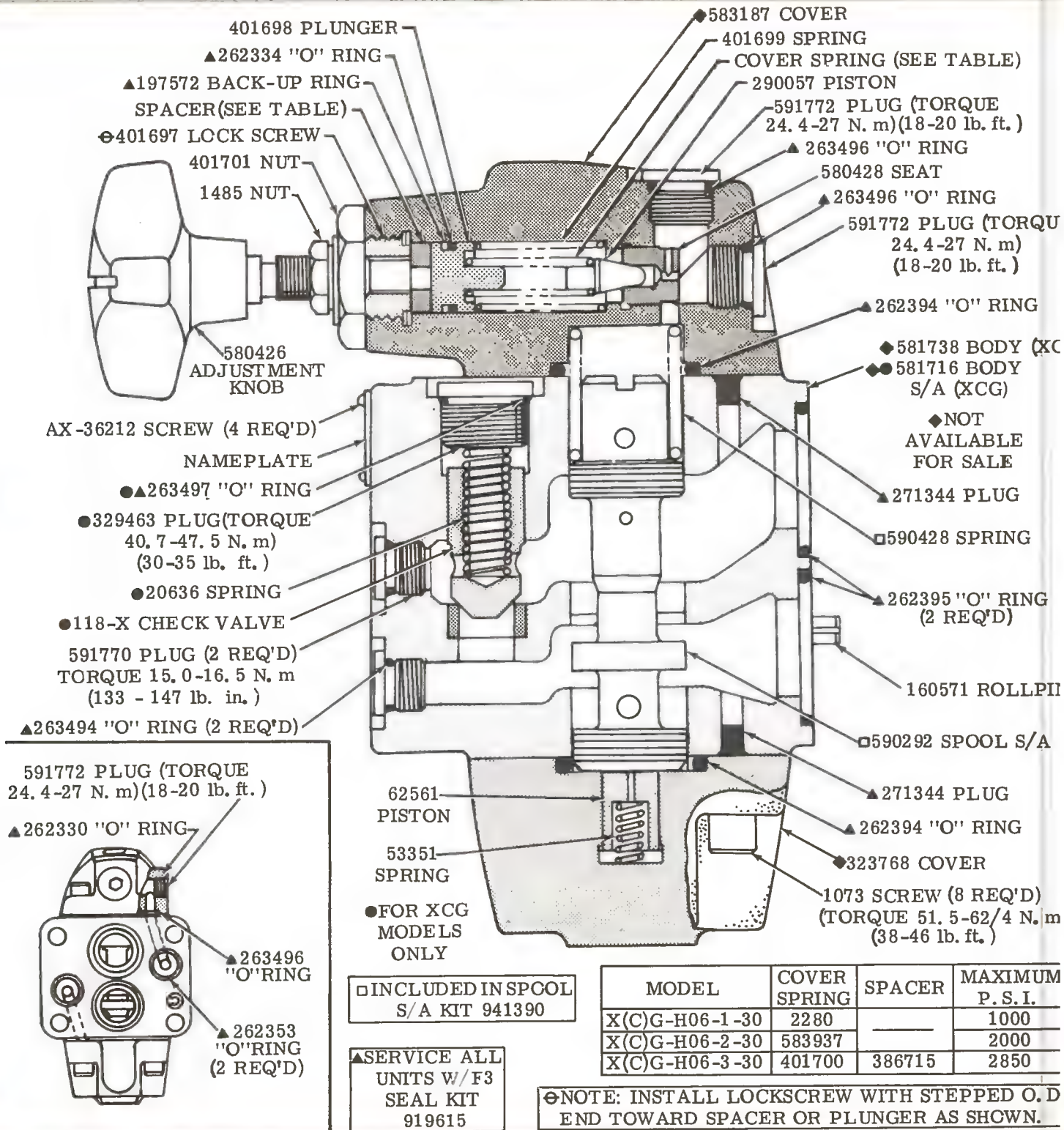
Litho in U. S. A.

Service Parts Information



PRESSURE REDUCING VALVES

X(C)G-H06-**-30



MODEL	COVER SPRING	SPACER	MAXIMUM P.S.I.
X(C)G-H06-1-30	2280	—	1000
X(C)G-H06-2-30	583937	—	2000
X(C)G-H06-3-30	401700	386715	2850

NOTE: INSTALL LOCKSCREW WITH STEPPED O.D. END TOWARD SPACER OR PLUNGER AS SHOWN.

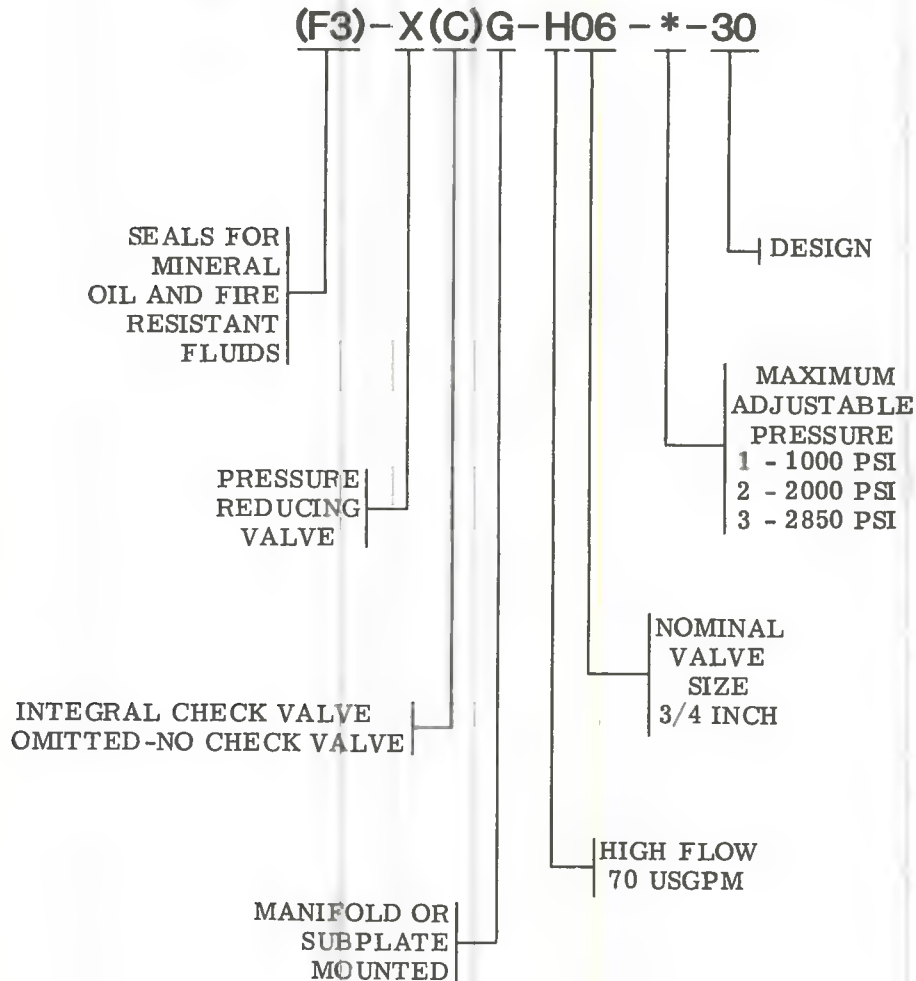
Vickers, Incorporated
1401 Crooks Road
Troy, Michigan 48084

Revised 8-1-85

I-3668-S

54

MODEL CODE BREAKDOWN



For satisfactory service life of these components in industrial applications, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from Vickers OFP, OFR, and OFRS series are recommended.

Litho in U. S. A.

Service Parts Information

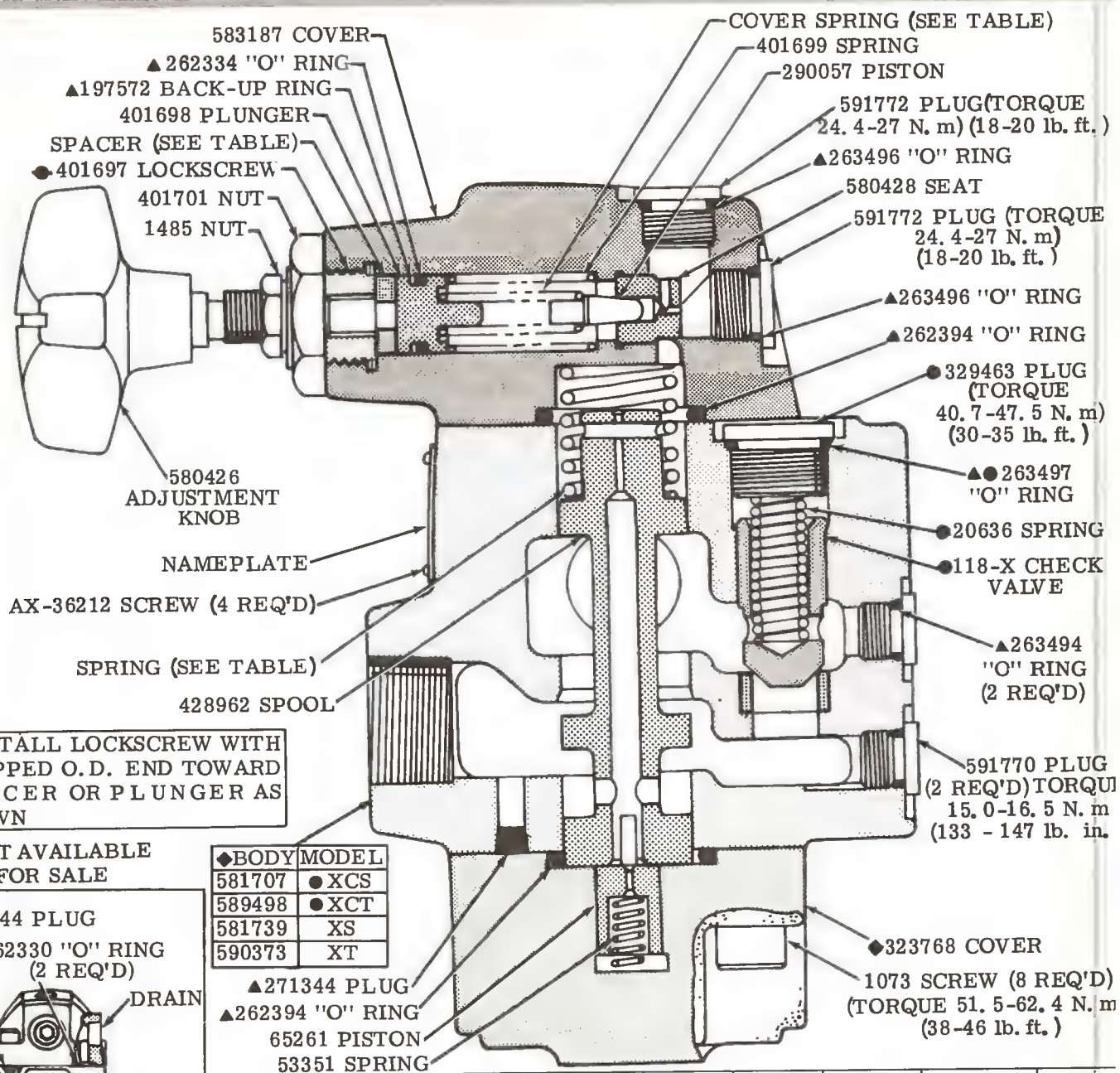
**PRESSURE
REDUCING
VALVES**

X(C)S-06--30**

X(C)T-06--30**

VICKERS®

A TRIMONA COMPANY



◆INSTALL LOCKSCREW WITH STEPPED O.D. END TOWARD SPACER OR PLUNGER AS SHOWN

◆NOT AVAILABLE FOR SALE

◆BODY	MODEL
581707	●XCS
589498	●XCT
581739	XS
590373	XT

▲271344 PLUG
▲262394 "O" RING
65261 PISTON
53351 SPRING

●XC*
MODELS
ONLY

▲SERVICE ALL
UNITS W/F3
SEAL KIT 919615

MODEL	SPRING	COVER SPRING	SPACER	PRESS. RANGE P.S.I.	FLOW RATE USGPM
X(C)*-06-1B-30	322653	2280		80-1000	15
X(C)*-06-1F-30	348614			200-1000	30
X(C)*-06-2B-30	322653	583937		80-2000	15
X(C)*-06-2F-30	348614			200-2000	30
X(C)*-06-3B-30	322653	401700	386715	200-2850	15
X(C)*-06-3F-30	348614				30

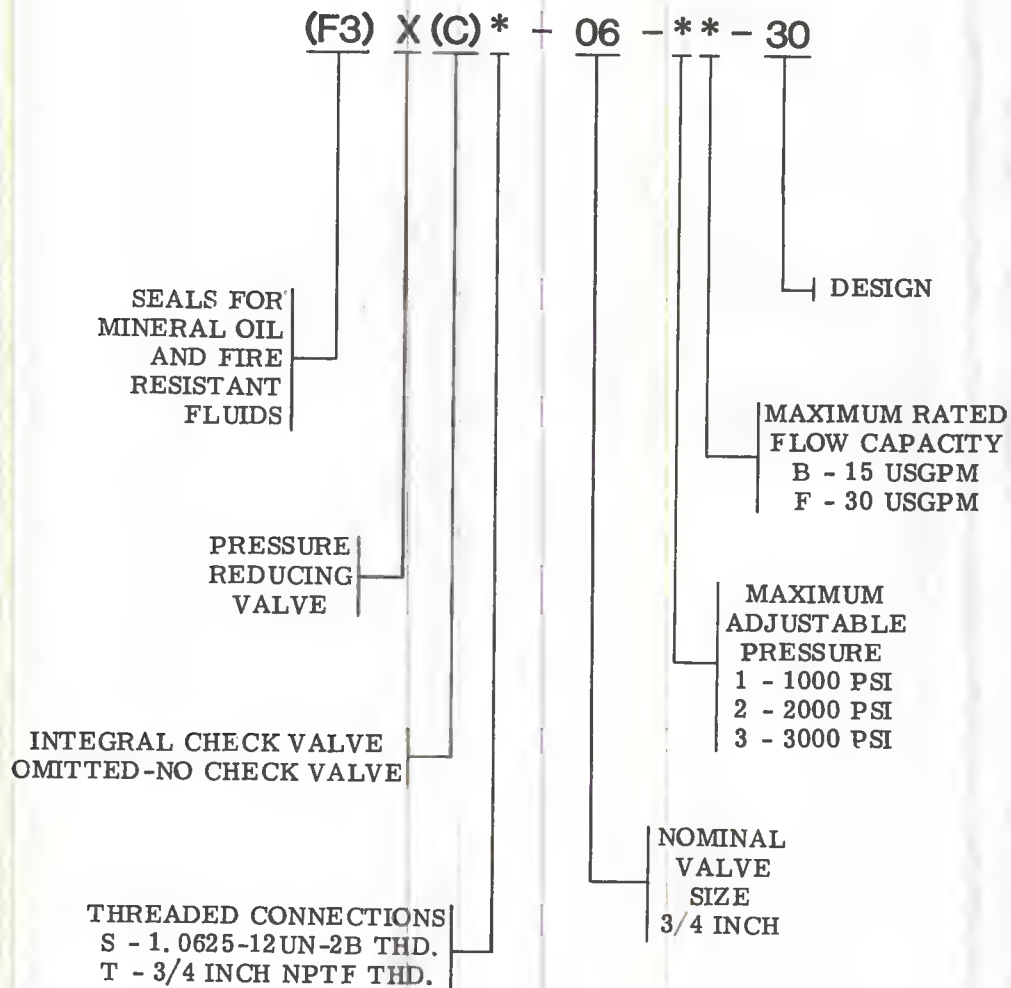
Vickers, Incorporated
P.O. Box 302
Troy, Michigan 48007-0302

Revised 9-1-87

I-3669-S

55

MODEL CODE BREAKDOWN



For satisfactory service life of these components, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from Vickers OFP, OFR and OFRS filter series are recommended.

Litho in U. S. A.

Service Parts Information

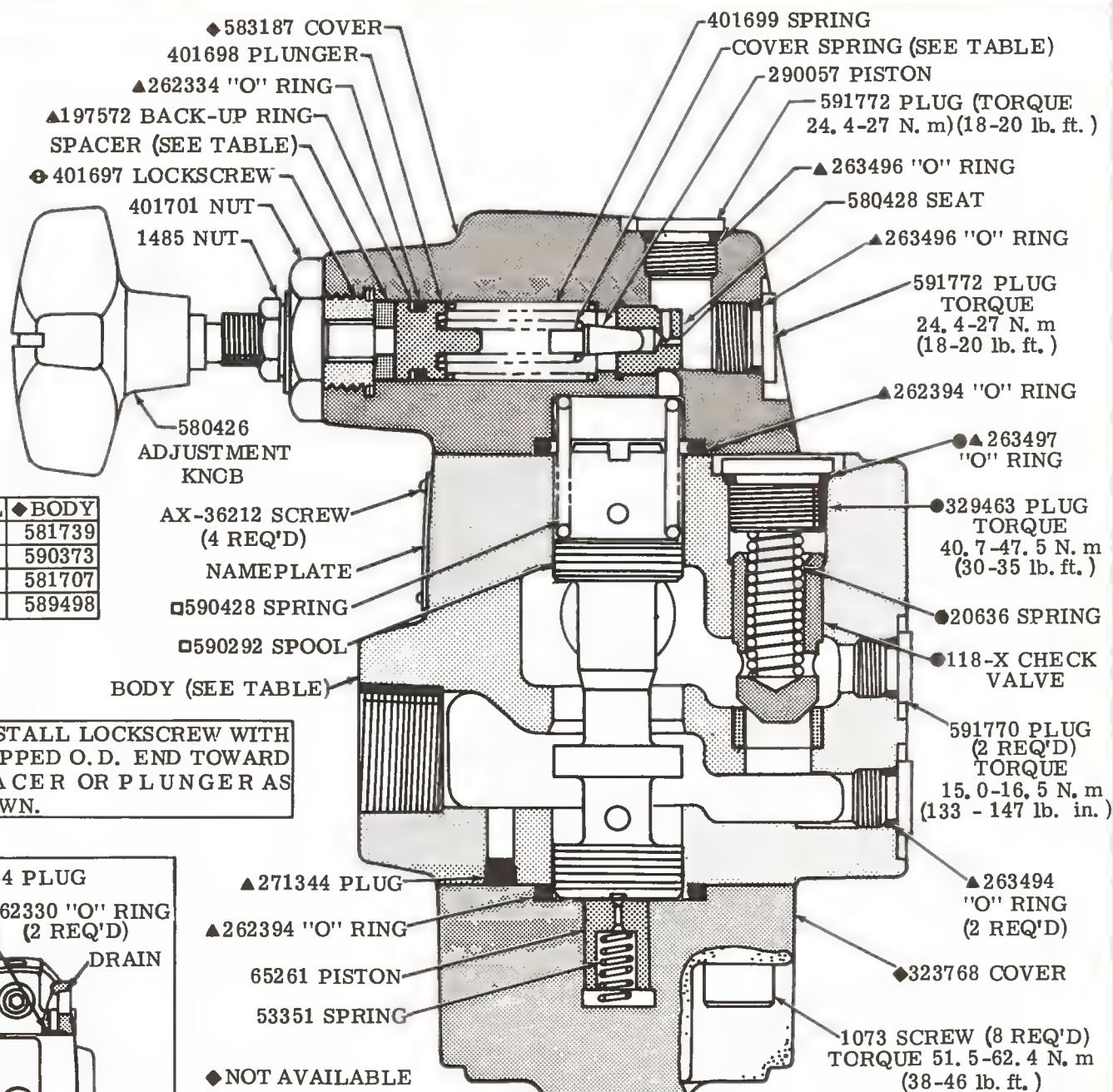
VICKERS

ATRIUMVA COMPANY

PRESSURE REDUCING VALVES

X(C)T-H06-*-30

X(C)S-H06-*-30



MODEL	◆BODY
XS	581739
XT	590373
●XCS	581707
●XCT	589498

◆INSTALL LOCKSCREW WITH STEPPED O.D. END TOWARD SPACER OR PLUNGER AS SHOWN.

◆NOT AVAILABLE FOR SALE

●XC* MODELS ONLY	□INCLUDED IN SPOOL S/A KIT 941390.
------------------	------------------------------------

▲SERVICE ALL UNITS W/F3 SEAL KIT 919615

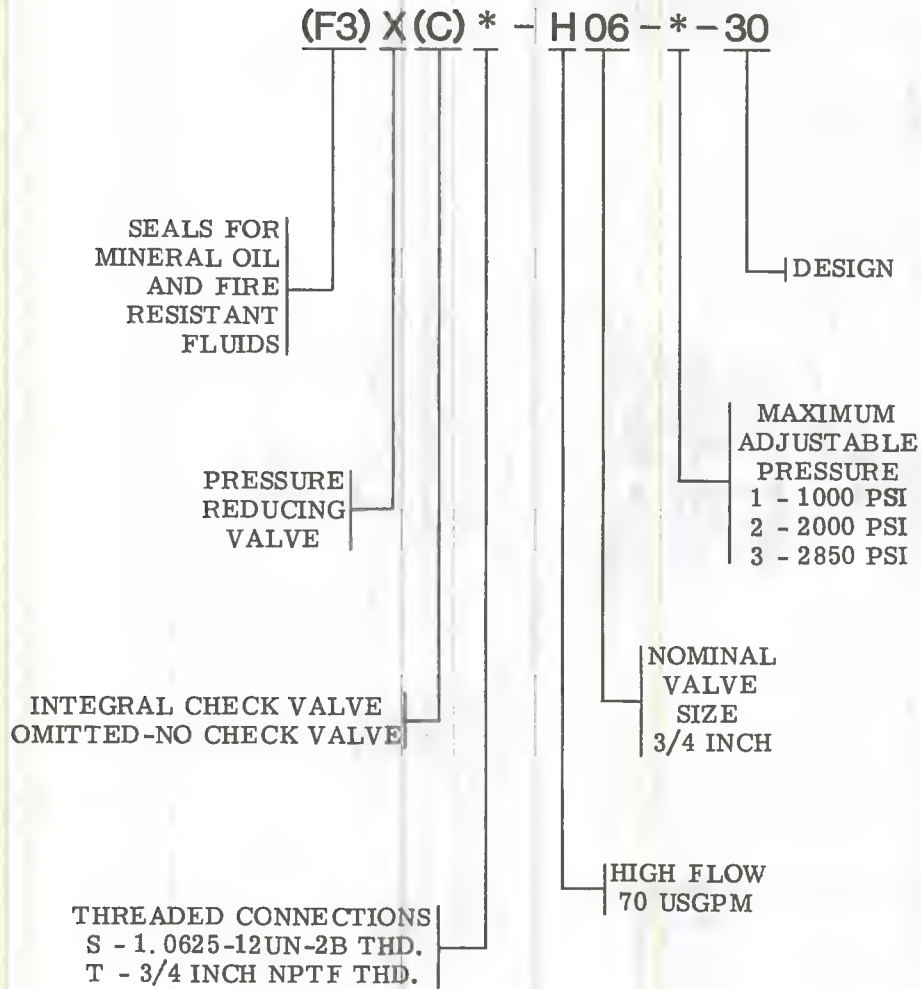
MODEL	COVER SPRING	SPACER	MAXIMUM P. S. I.
X(C)*-H06-1-30	2280	—	1000
X(C)*-H06-2-30	583937	—	2000
X(C)*-H06-3-30	401700	386715	2850

Vickers, Incorporated
P.O. Box 302
Troy, Michigan 48007-0302

Revised 8-1-85

I-3670-S

MODEL CODE BREAKDOWN



For satisfactory service life of these components in industrial applications, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from Vickers OFP, OFR, and OFRS series are recommended.

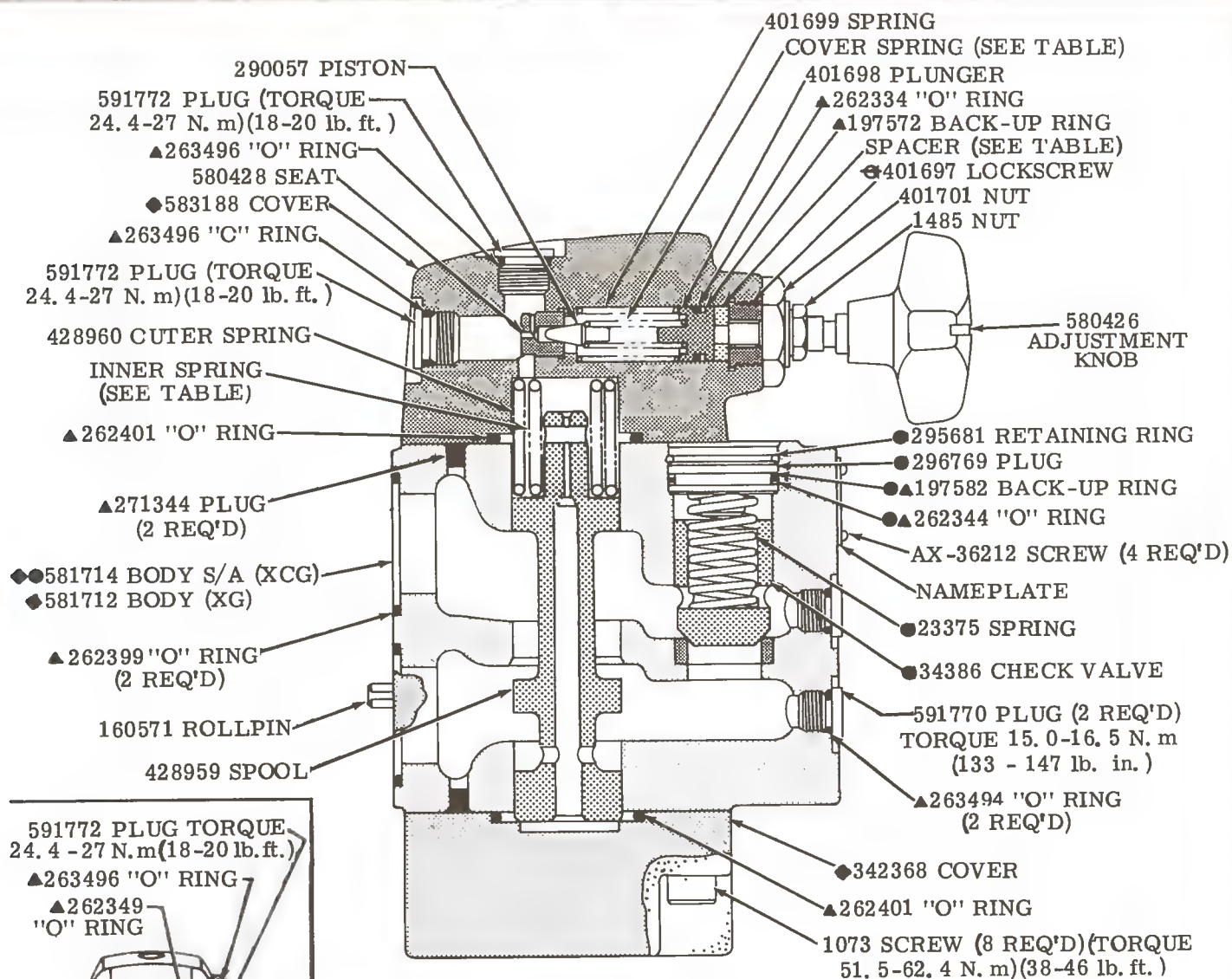
Litho in U. S. A.

Service Parts Information

VICKERS®
A TRIMCO COMPANY

PRESSURE REDUCING VALVES

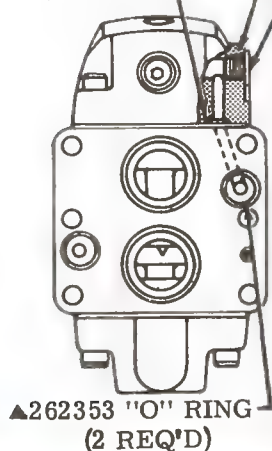
X(C)G-10-**-30



591772 PLUG TORQUE 24.4 - 27 N.m(18-20 lb.ft.)

▲263496 "O" RING

▲262349 "O" RING



●XCG MODELS ONLY

◆NOT AVAILABLE FOR SALE

MODEL	INNER SPRING	COVER SPRING	SPACER	PRESS RANGE PSI	FLOW RATE GPM
X(C)G-10-1B-30	—	2280	—	100-1000	25
X(C)G-10-1F-30	428961	—	—	165-1000	50
X(C)G-10-2B-30	—	583937	—	225-1000	75
X(C)G-10-2F-30	428961	—	—	100-2000	25
X(C)G-10-3F-30	—	401700	386715	165-2000	50
				225-2000	75
				225-2850	75

▲SERVICE ALL UNITS
W/F3 SEAL KIT 919852

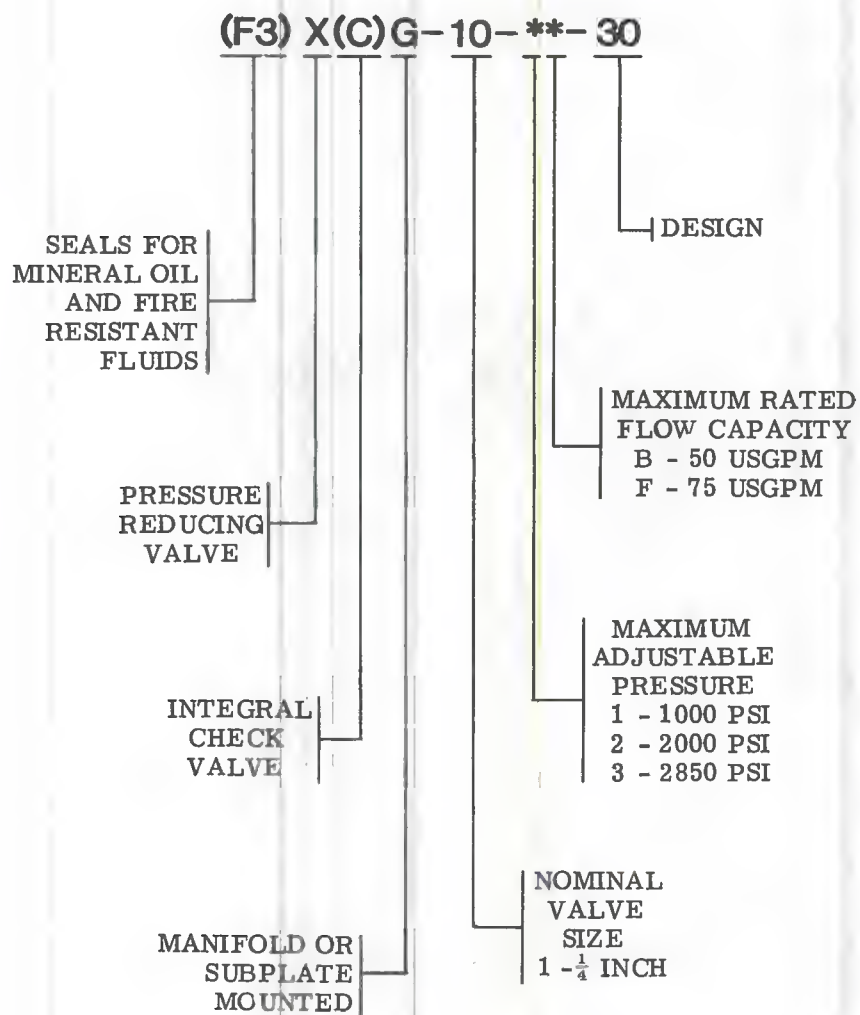
⊕INSTALL LOCKSCREW WITH STEPPED O.D. END TOWARD SPACER OR PLUNGER

Vickers, Incorporated
P.O. Box 302
Troy, Michigan 48007-0302

Revised 8-1-85

I-3671-S

MODEL CODE BREAKDOWN



For satisfactory service life of these components in industrial applications, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from Vickers OFP, OFR, and OFRS series are recommended.

Litho in U. S. A.

Service Parts Information

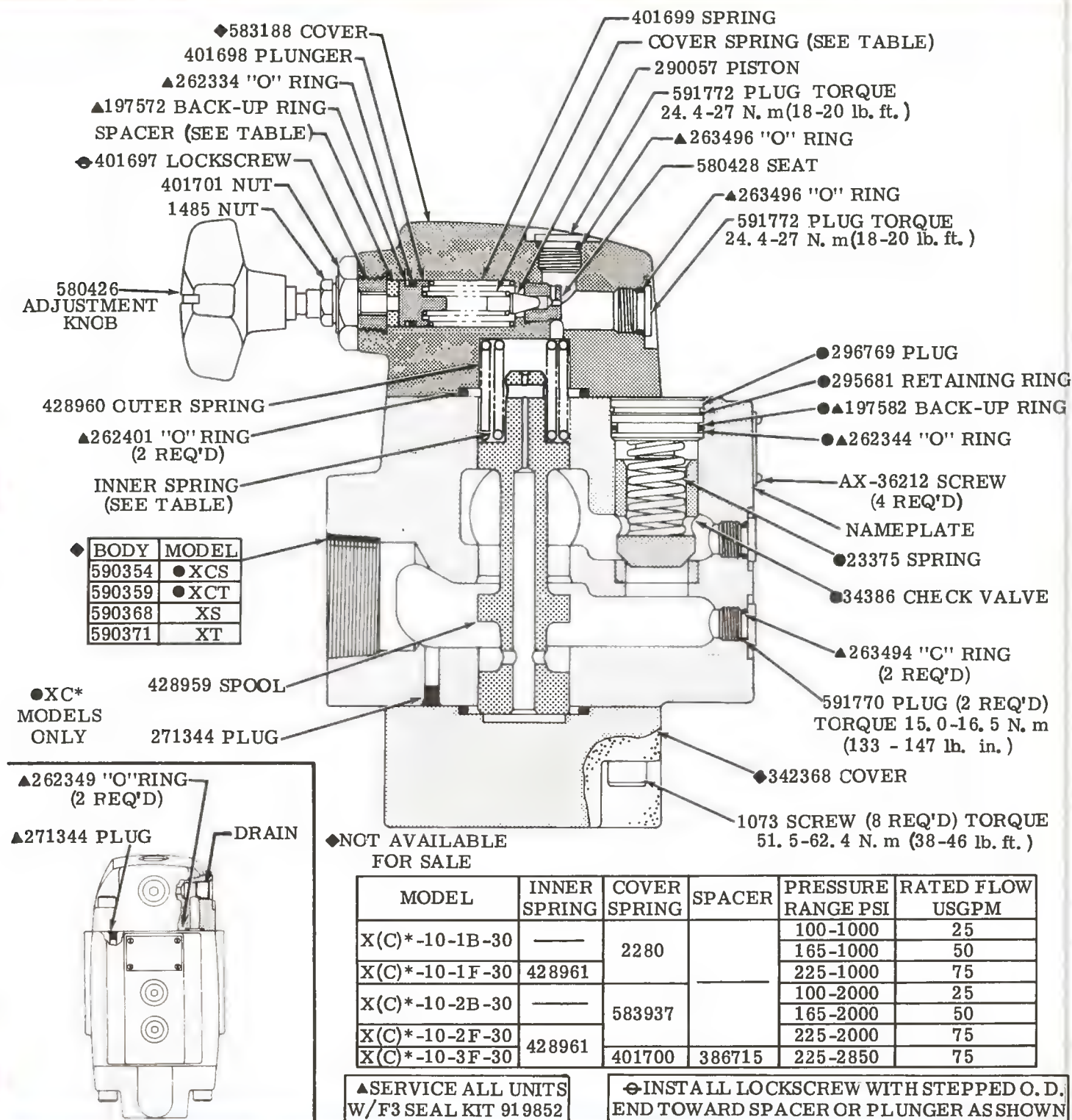
PRESSURE REDUCING VALVES

X(C)T-10-**-30

X(C)S-10-**-30

VICKERS

A TRIMONA COMPANY

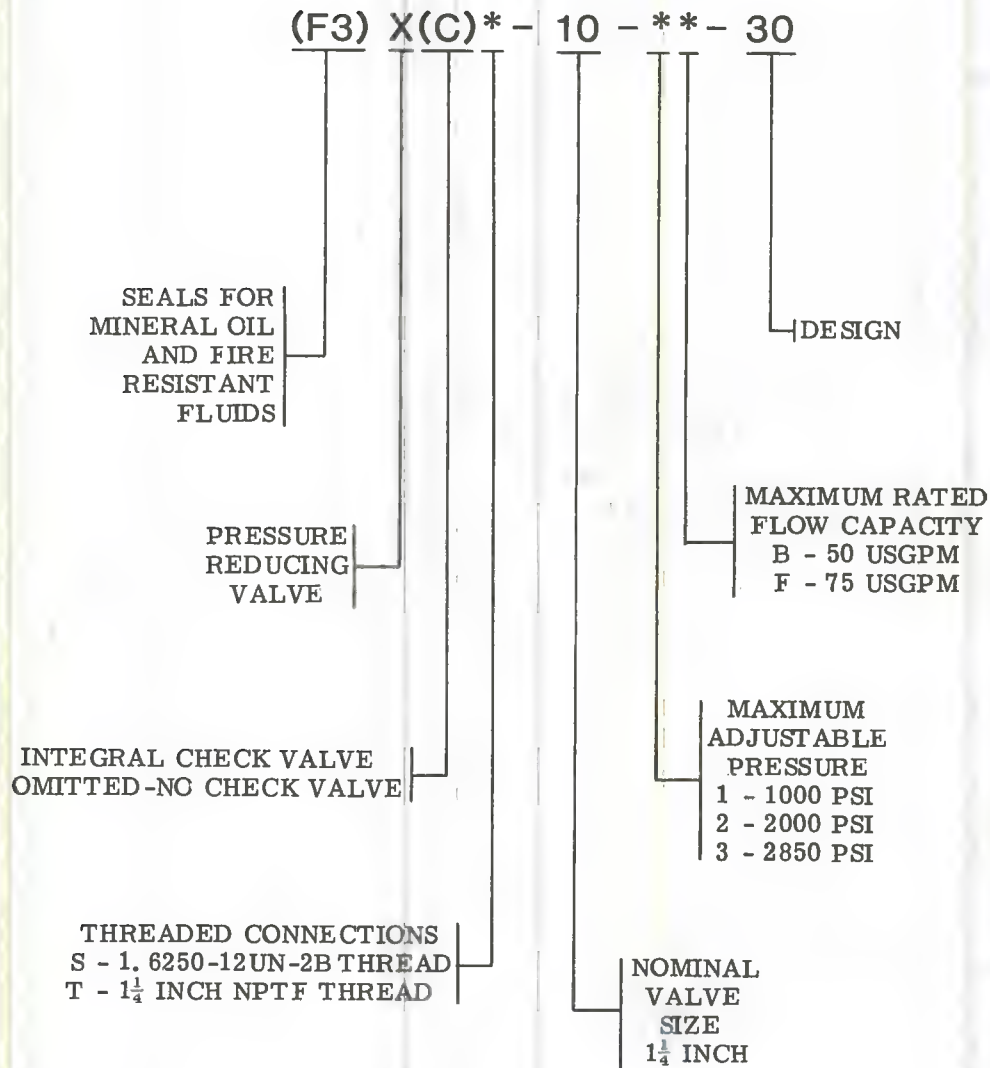


Vickers, Incorporated
P.O. Box 302
Troy, Michigan 48007-0302

Revised 8-1-85

I-3673-S

MODEL CODE BREAKDOWN



For satisfactory service life of these components in industrial applications, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from Vickers OFF, OFR, and OFRS series are recommended.

Litho in U. S. A.

Service Parts Information

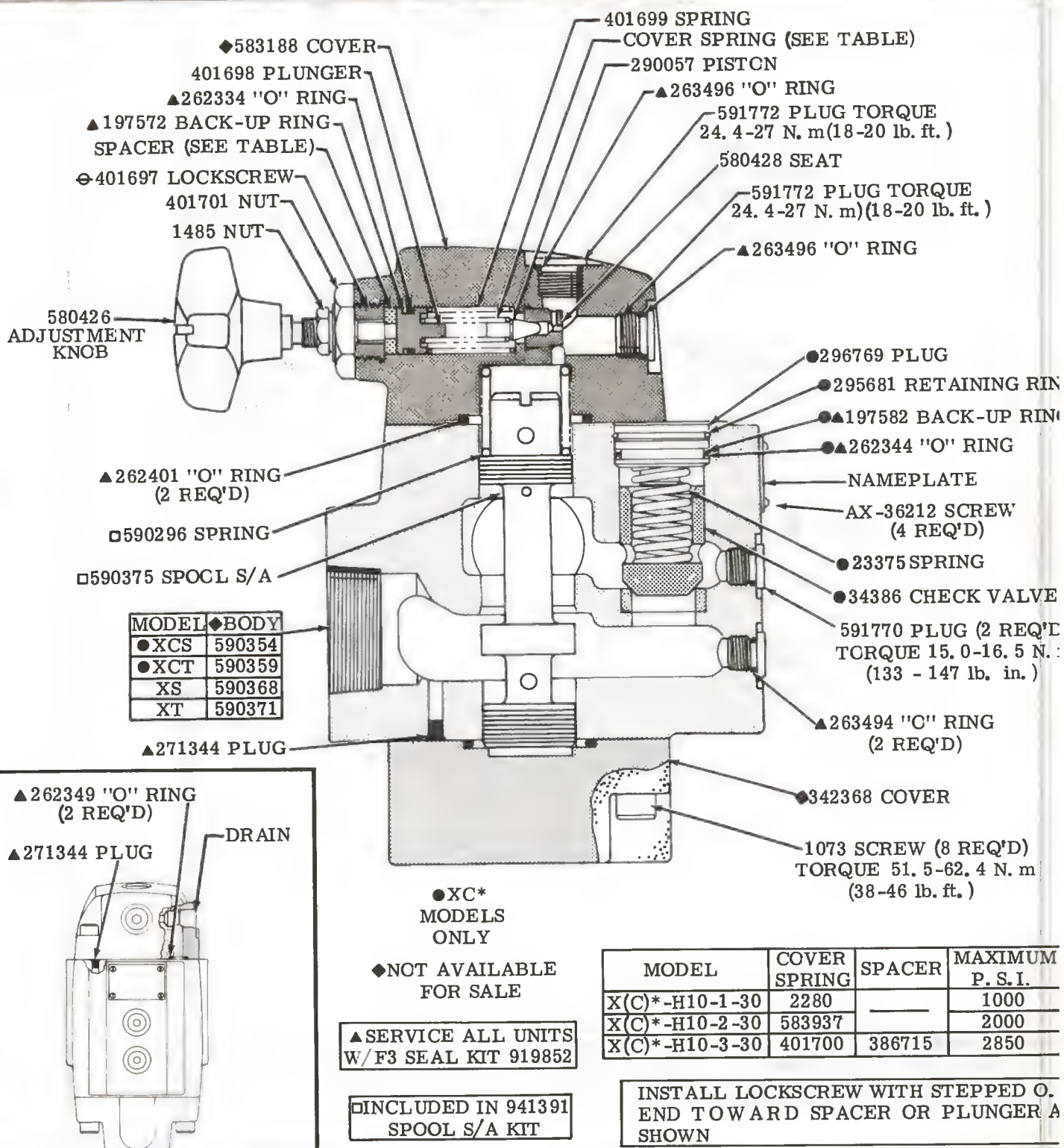
VICKERS

A TRIMONA COMPANY

PRESSURE REDUCING VALVES

X(C)T-H10-*-30

X(C)S-H10-*-30



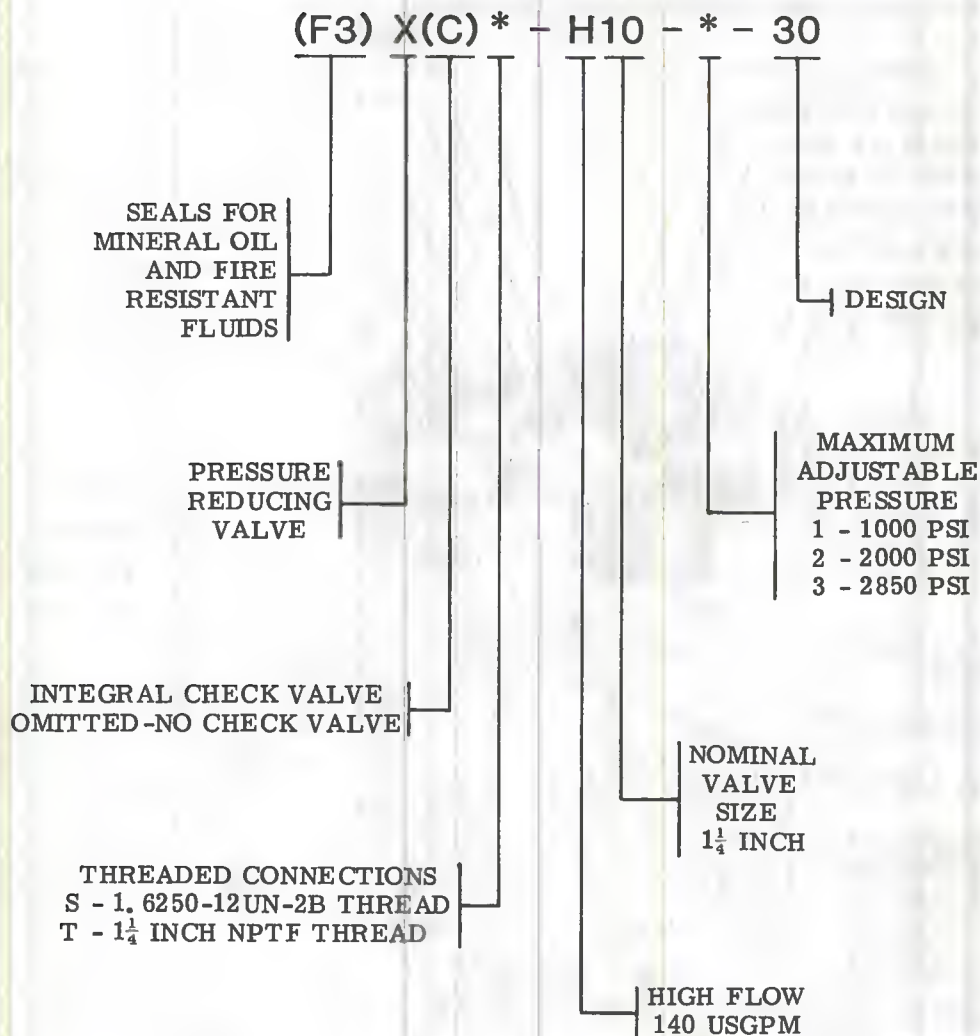
Vickers, Incorporated
P.O. Box 302
Troy, Michigan 48007-0302

Revised 8-1-85

I-3674-S

59

MODEL CODE BREAKDOWN



For satisfactory service life of these components in industrial applications, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from Vickers OFP, OFR, and OFRS series are recommended.

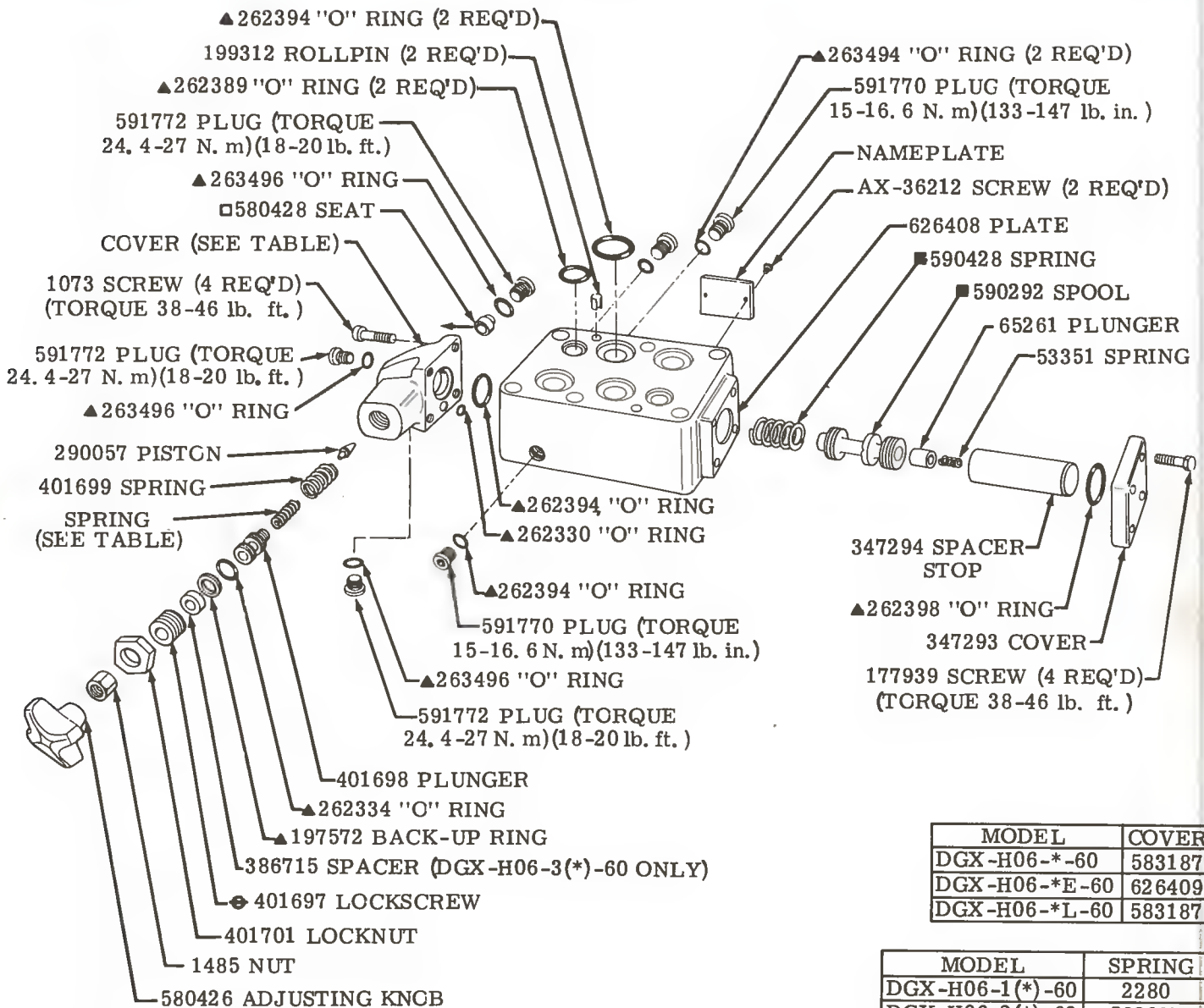
Litho in U. S. A.

Service Parts Information

**PRESSURE
REDUCING
VALVES**

(F3)DGX-H06-*(*)-60

VICKERS
A TRIMONA COMPANY



MODEL	COVER
DGX-H06-*-60	583187
DGX-H06-*E-60	626409
DGX-H06-*L-60	583187

MODEL	SPRING
DGX-H06-1(*)-60	2280
DGX-H06-2(*)-60	583937
DGX-H06-3(*)-60	401700

■ INCLUDED IN SPOOL KIT 941390

▲SERVICE ALL UNITS
W/ F3 SEAL KIT 920126

⊕ASSEMBLE 401697 LOCKSCREW
WITH STEPPED O.D. END TOWARD
386715 SPACER OR PLUNGER.

□NOTE

ASSEMBLE SEAT IN COVER WITH
CROSSHOLE POINTING IN DIREC-
TION OF ARROW. COIN PISTON
TO NEW SEAT.

Vickers, Incorporated
P.O. Box 302
Troy, Michigan 48007-0302

Revised 12-1-87

I-3646-S

60

MODEL CODE BREAKDOWN

(F3) DGX - H06 - * (*) - 60

SEALS FOR
MINERAL OIL
AND FIRE
RESISTANT
FLUIDS

DIRECTIONAL
CONTROL

SUBPLATE OR
MANIFOLD
MOUNTED

PRESSURE
REDUCING
MODULE

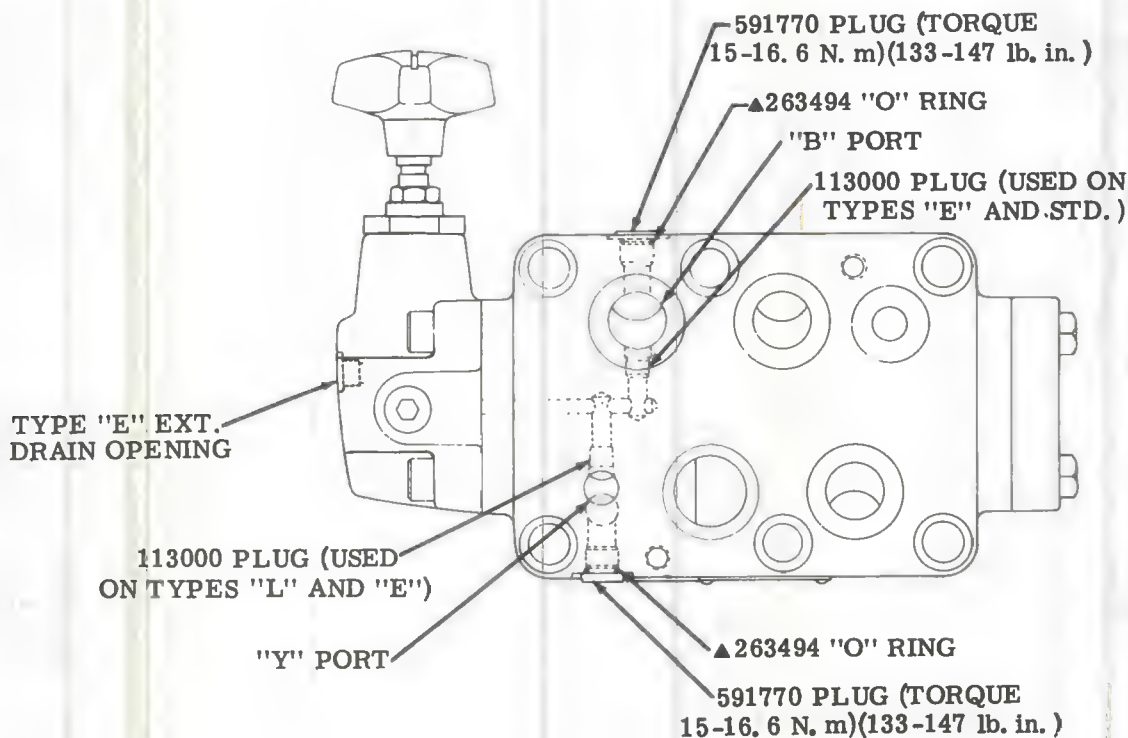
DESIGN

(OMITTED) STD. EXT. DRAINED
TO "Y" PORT.
TYPE "E" EXT. DRAINED THRU
COVER.
TYPE "L" INT. DRAINED TO
"B" PORT.

MAXIMUM ADJUSTABLE PRESSURE
1-1000 PSI, 2-2000 PSI, 3-2850 PSI

06 - 3/4 INCH SIZE

HIGH FLOW CAPACITY
70 USGPM MODEL



For satisfactory service life of these components, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from Vickers OFF, OFR, and OFRS series are recommended.

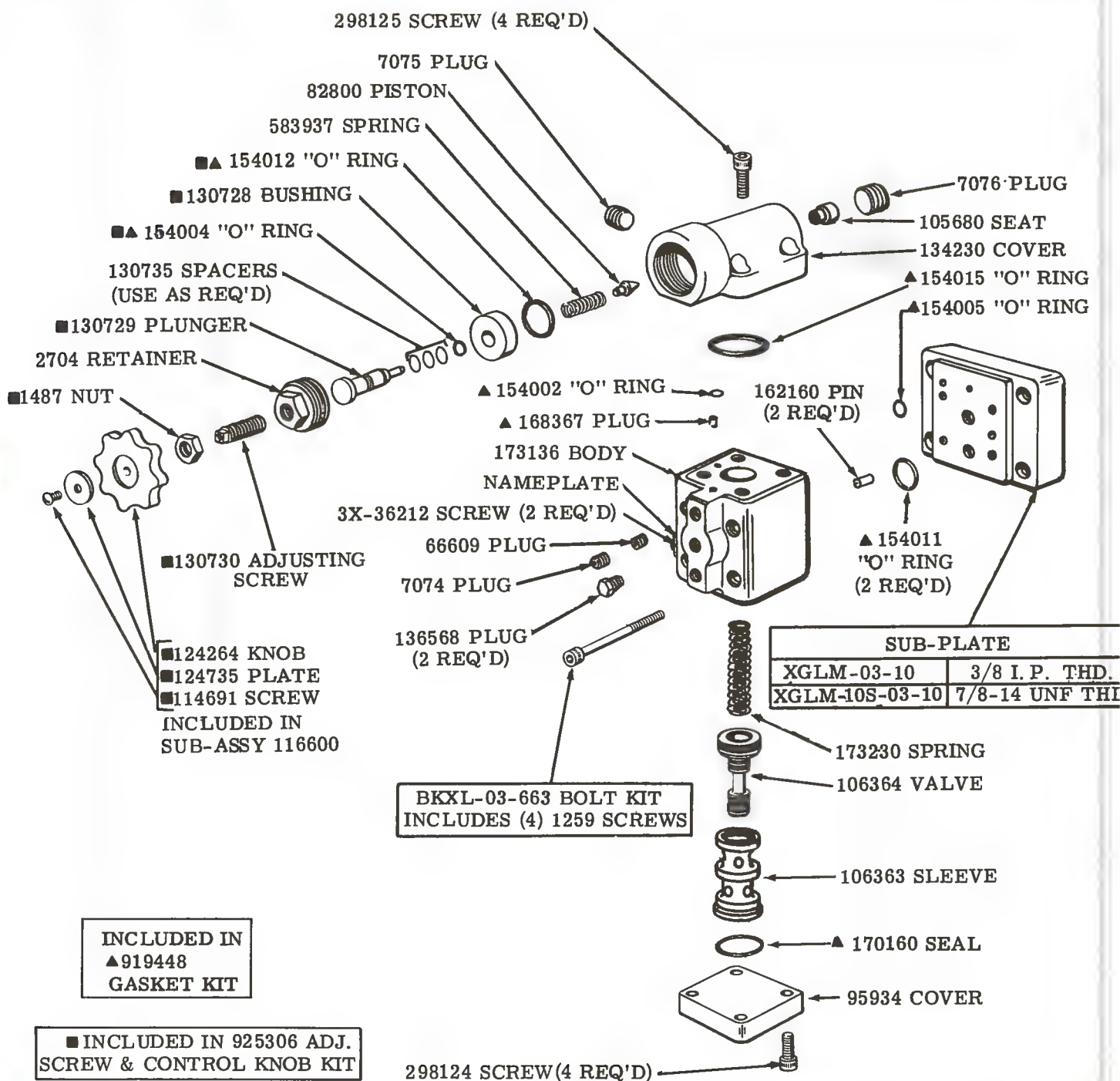
Litho in U. S. A.

Service Parts Information

**PRESSURE
REDUCING
VALVES**

XGL-03-B-10
XSL-03-B-10
XTL-03-B-10

VICKERS®
A TRIMOVA COMPANY



Vickers, Incorporated
P.O. Box 302
Troy, Michigan 48007-0302

Revised 11-1-85

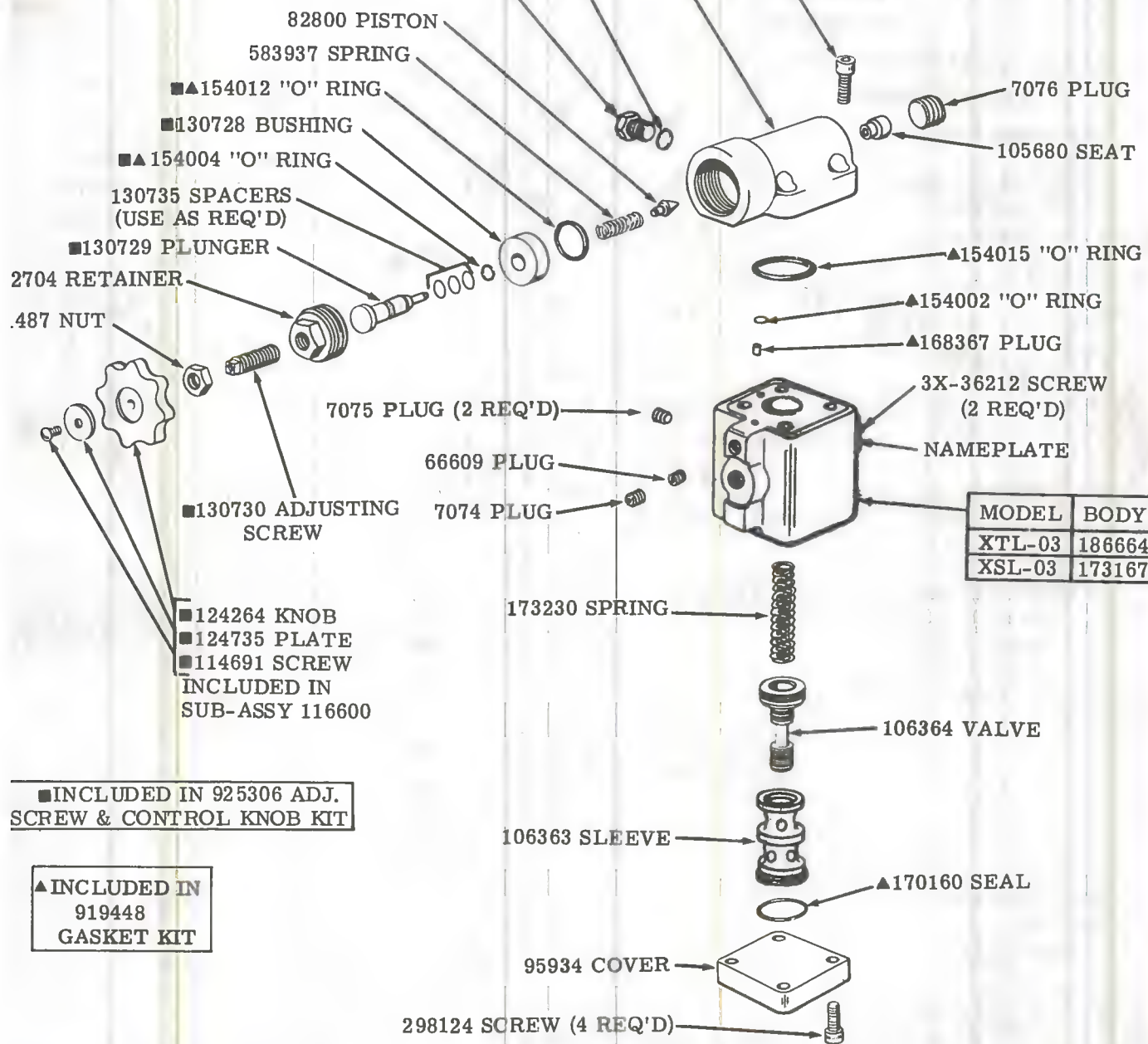
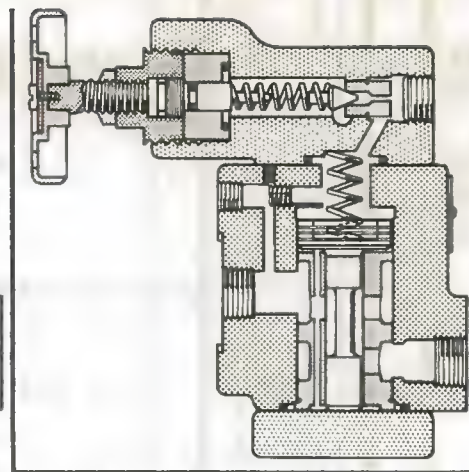
I-3350-S

61

XTL-03-B-10 NOMINAL PIPE THREAD 3/8"

XSL-03-B-10 14 SAE STRAIGHT THREAD 7/8"

MODEL	PLUG	SEAL	COVER	SCREW (4 REQ'D)
XTL-03	16127	—	134230	298125
XSL-03	191362	▲154128	191363	



MODEL	BODY
XTL-03	186664
XSL-03	173167

For satisfactory service life of these components, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from Vickers OFP, OFR, and OFRS series are recommended.

Litho in U.S.A.

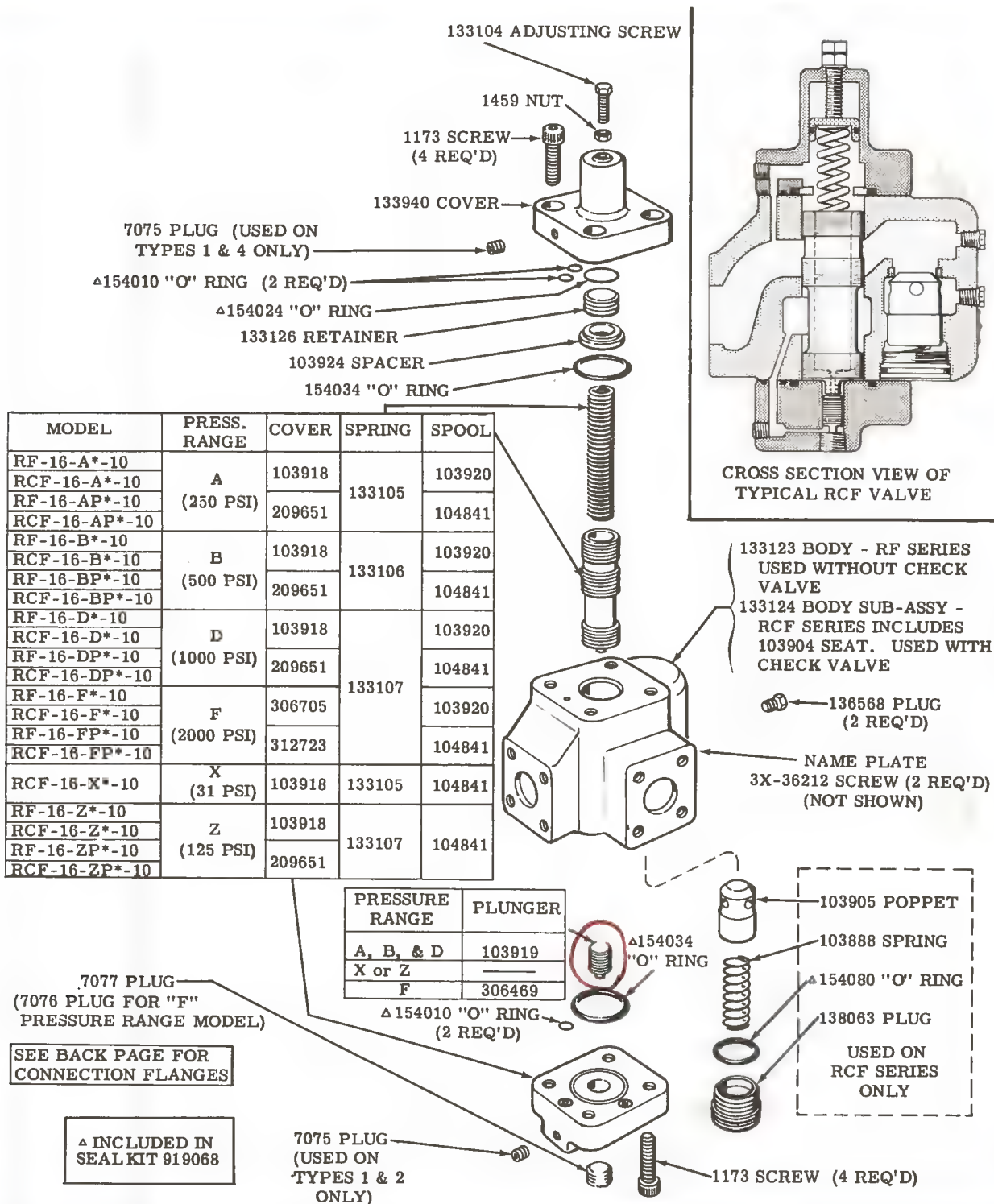
Service Parts Information

PRESSURE CONTROL VALVES

RF & RCF-16-*P*-10

RF & RCF-16-**-10

VICKERS
A TRIMONA COMPANY



MODEL CODE BREAKDOWN

R (C) F-16-*(P)*-10

PRESSURE CONTROL VALVE

DESIGN NUMBER

You don't have this
 C - WITH INTEGRAL CHECK VALVE
 (REVERSE FREE FLOW)
 X (OMITTED - WITHOUT CHECK VALVE)

FLANGE CONNECTIONS

VALVE SIZE - 2" NOMINAL

VALVE TYPES
 (INSET VIEWS AT BOTTOM
 OF PAGE SHOW THE COVER
 POSITIONS FOR VALVE
 TYPES 1 THROUGH 4)

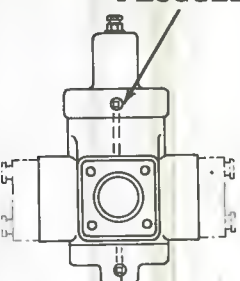
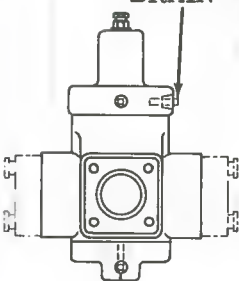
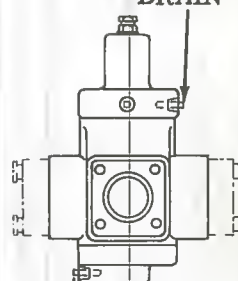
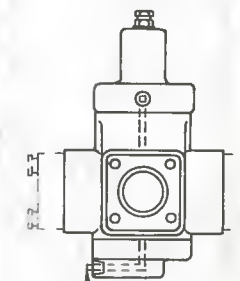
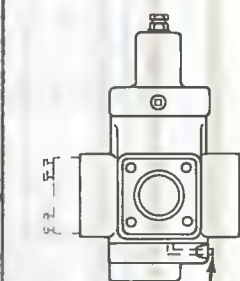
CONTROL
 P - AUXILIARY CONTROL
 (MAY BE USED WITH
 ANY OF THE 4 VALVE
 TYPES SHOWN)
 (OMITTED - STANDARD CONTROL)

FLANGE CONNECTIONS (NOT FURNISHED WITH UNIT)		
MODEL	PIPE SIZE	TYPE
FL-12-PS-20	1-1/2"	STRAIGHT
FL-16-PS-20	2"	
FL-12-PL-20	1-1/2"	ELL
FL-16-PL-20	2"	
FLANGES ARE FURNISHED WITH A SEAL, SCREWS AND WASHERS FOR FASTENING		

PRESSURE RATING

A - 250 PSI
 B - 500 PSI
 D - 1000 PSI
 F - 2000 PSI
 Z - 125 PSI

NOTE: ASSEMBLE COVERS AS SHOWN TO OBTAIN VALVE ACTION DESIRED.

TYPE 1	TYPE 2	TYPE 3	TYPE 4	"P" FEATURE
DIRECTLY CONTROLLED INTERNAL DRAIN DRAIN PLUGGED	DIRECTLY CONTROLLED EXTERNAL DRAIN EXTERNAL DRAIN	REMOTELY CONTROLLED EXTERNAL DRAIN EXTERNAL DRAIN	REMOTELY CONTROLLED INTERNAL DRAIN	AUXILIARY CONTROL VALVE TYPE IS OPTIONAL
				
PLUGGED	PLUGGED	REMOTE CONTROL CONNECTION	REMOTE CONTROL CONNECTION	AUXILIARY CONTROL CONNECTION

For satisfactory service life of these components, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from Vickers OFP, OFR, and OFRS series are recommended.

Service Parts Information

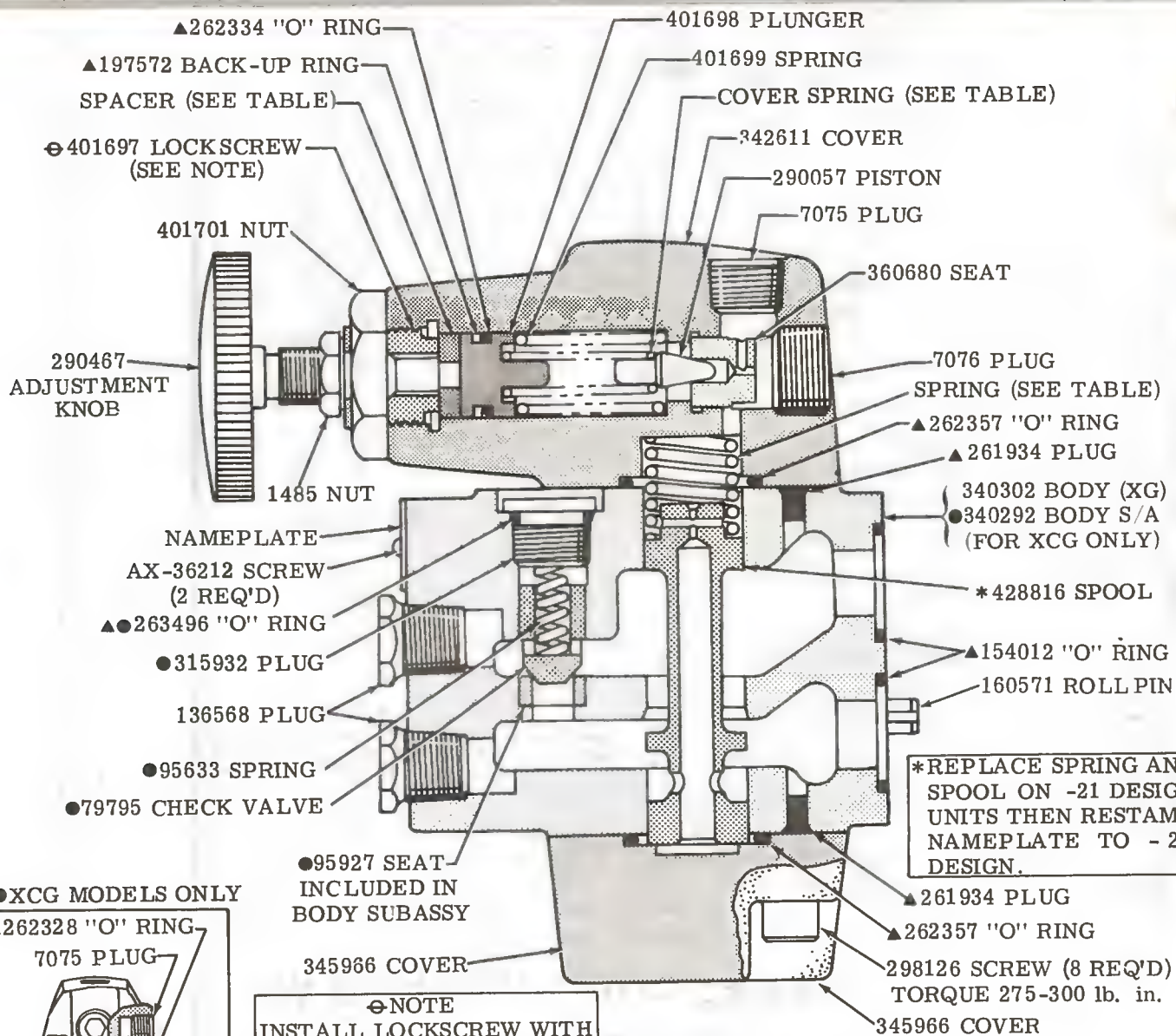
PRESSURE REDUCING VALVES

(F3)X(C)T-03-**-21/22

(F3)X(C)G-03-**-21/22

VICKERS

A TRIMONA COMPANY



NOTE
INSTALL LOCKSCREW WITH
STEPPED O.D. END TOWARD
SPACER OR SPRING RETAIN-
ER AS SHOWN.

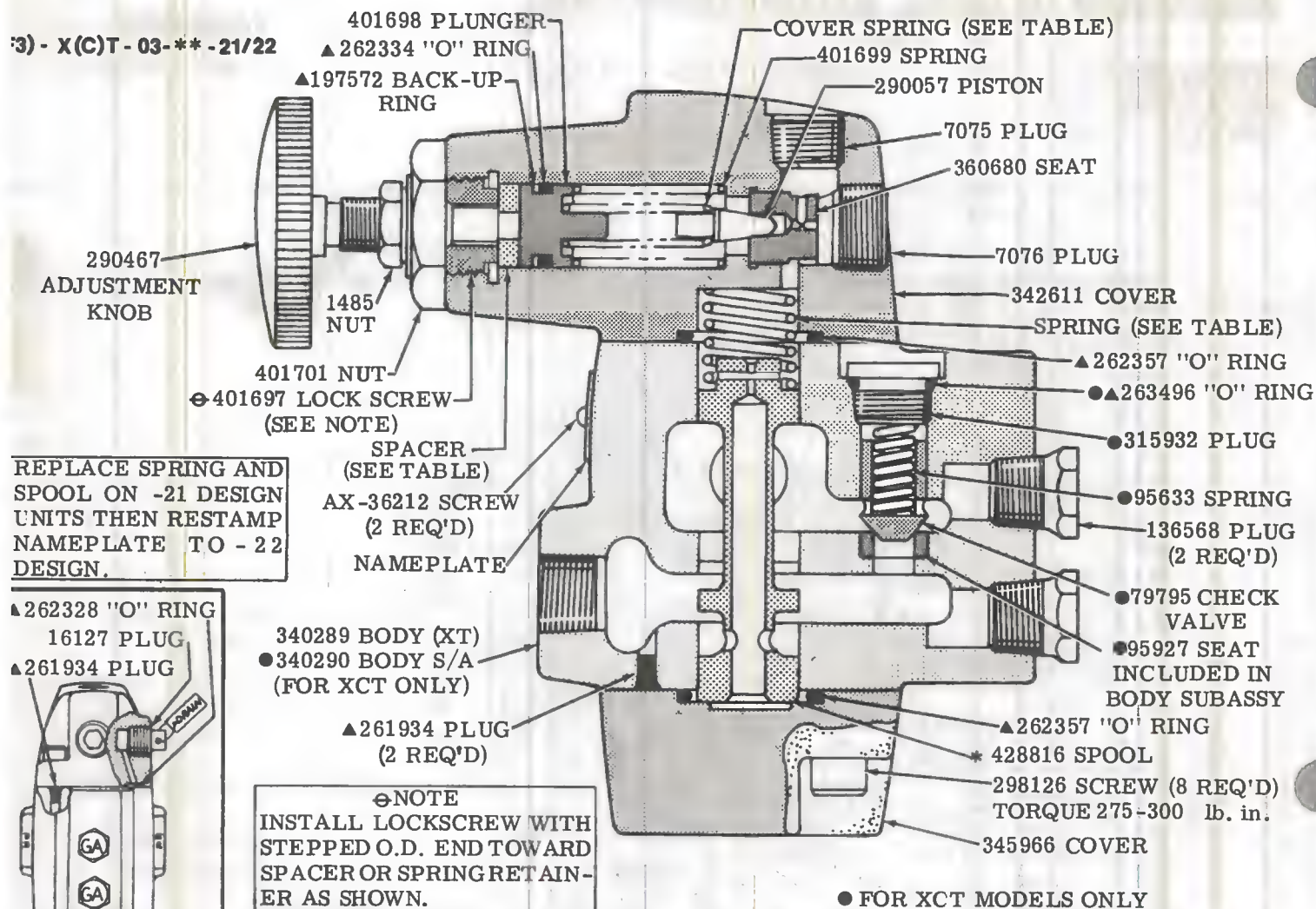
INCLUDED IN F3
SEAL KIT 919836

MODEL	* SPRING	COVER SPRING	SPACER	PRESSURE RANGE PSI	RATED FLOW USGPM
X(C)G-03-1B-21/22	428817	2280		75-1000	7
X(C)G-03-1F-21/22	428818			150-1000	14
X(C)G-03-2B-21/22	428817	583937		75-2000	7
X(C)G-03-2F-21/22	428818			150-2000	14
X(C)G-03-3F-21/22		401700	386715	150-2850	

Vickers, Incorporated
P.O. Box 302
Troy, Michigan 48007-0302

Revised 11-1-85

I-3357-S



MODEL	*SPRING	COVER SPRING	SPACER	PRESSURE RANGE PSI	RATED FLOW USGPM
X(C)T-03-1B-21/22	428817	2280		75-1000	7
X(C)T-03-1F-21/22	428818			150-1000	14
X(C)T-03-2B-21/22	428817	583937		75-2000	7
X(C)T-03-2F-21/22	428818			150-2000	14
X(C)T-03-3F-21/22		401700	386715	150-2850	

MODEL CODE BREAKDOWN

(F3) - X (C)* - 03 - ** - 2*

SEALS FOR MINERAL OIL
 & FIRE RESISTANT FLUIDS

PRESSURE REDUCING

CHECK VALVE

MOUNTING

G - MANIFOLD OR
 SUBPLATE

T - 3/8 IN. NPTF THREAD

3/8 IN. VALVE SIZE

-21/-22 DESIGN

MAXIMUM RATED USGPM FLOW CAPACITY
 B - 7 USGPM 75 MIN. ADJ. PRESS.
 F - 14 USGPM 150 MIN. ADJ. PRESS.

MAXIMUM PRESSURE ADJUSTMENT
 1 - 1000 PSI
 2 - 2000 PSI
 3 - 2850 PSI (150 PSI MINIMUM RECOMMENDED)

For satisfactory service life of these components, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from Vickers OFP, OFR, and OFRS series are recommended.

Litho in U.S.A.

Service Parts Information

MODULAR SEQUENCE VALVES

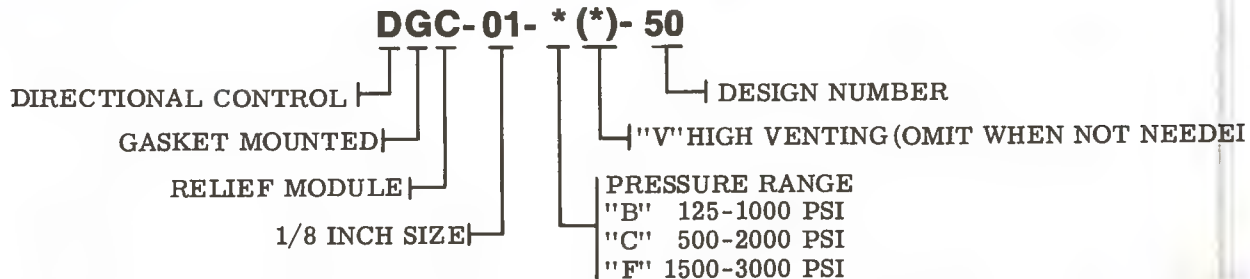
DGC-06-*(*)-50

DGC-01-*(*)-50

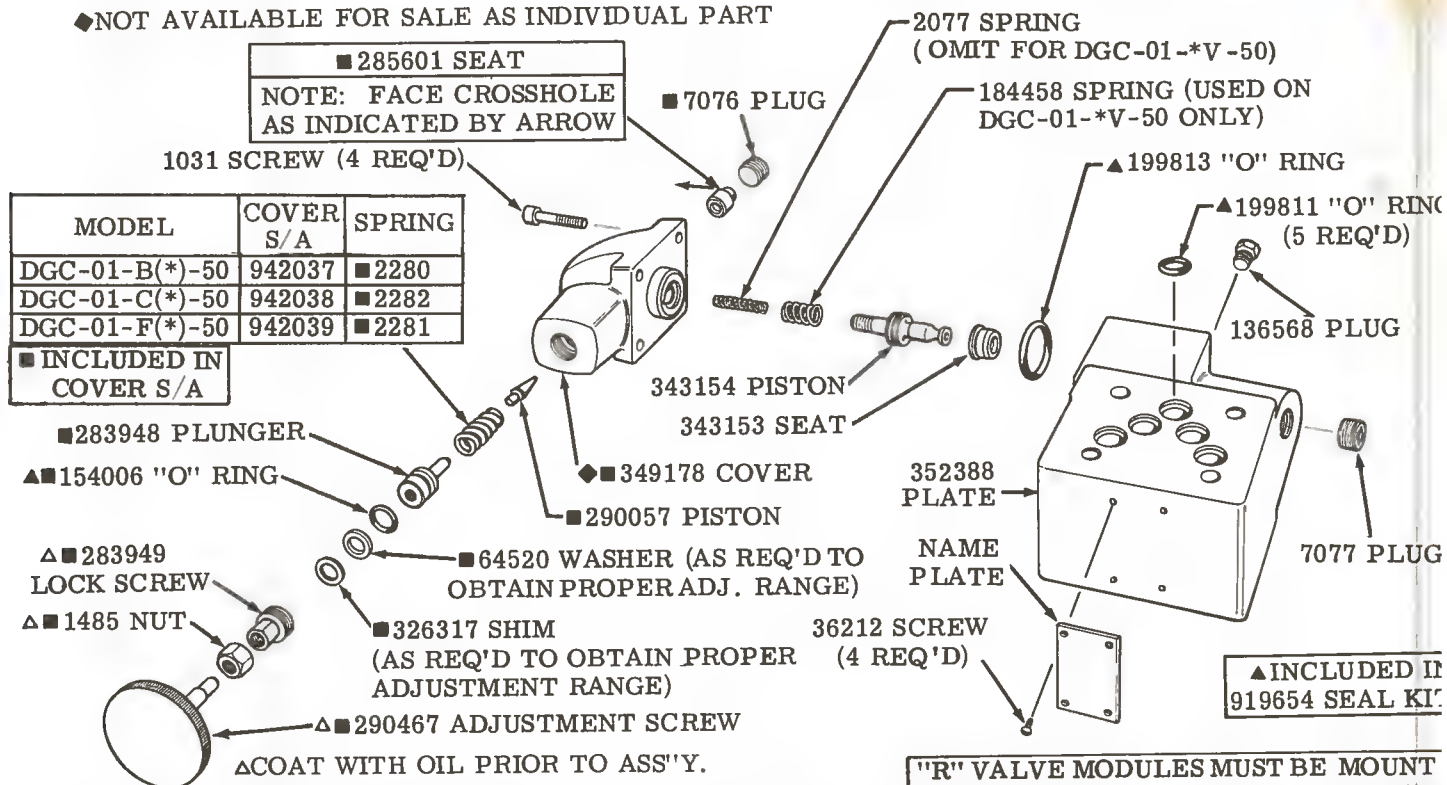
VICKERS
A TRIMONA COMPANY

MODEL CODE BREAKDOWN

"10" SERIES



◆ NOT AVAILABLE FOR SALE AS INDIVIDUAL PART



REFER TO INSTALLATION DRAWING 522650 FOR BOLT KIT INFORMATION AND MODULE STACKING DATA. THE MOUNTING BOLT TORQUE SHOULD NOT EXCEED A MAXIMUM OF 112 IN. LBS.

THE FOLLOWING SUBPLATES MAY BE USED TO MOUNT A 10 SERIES DIRECTIONAL VALVE AND ONE OR MORE MODULAR VALVES:

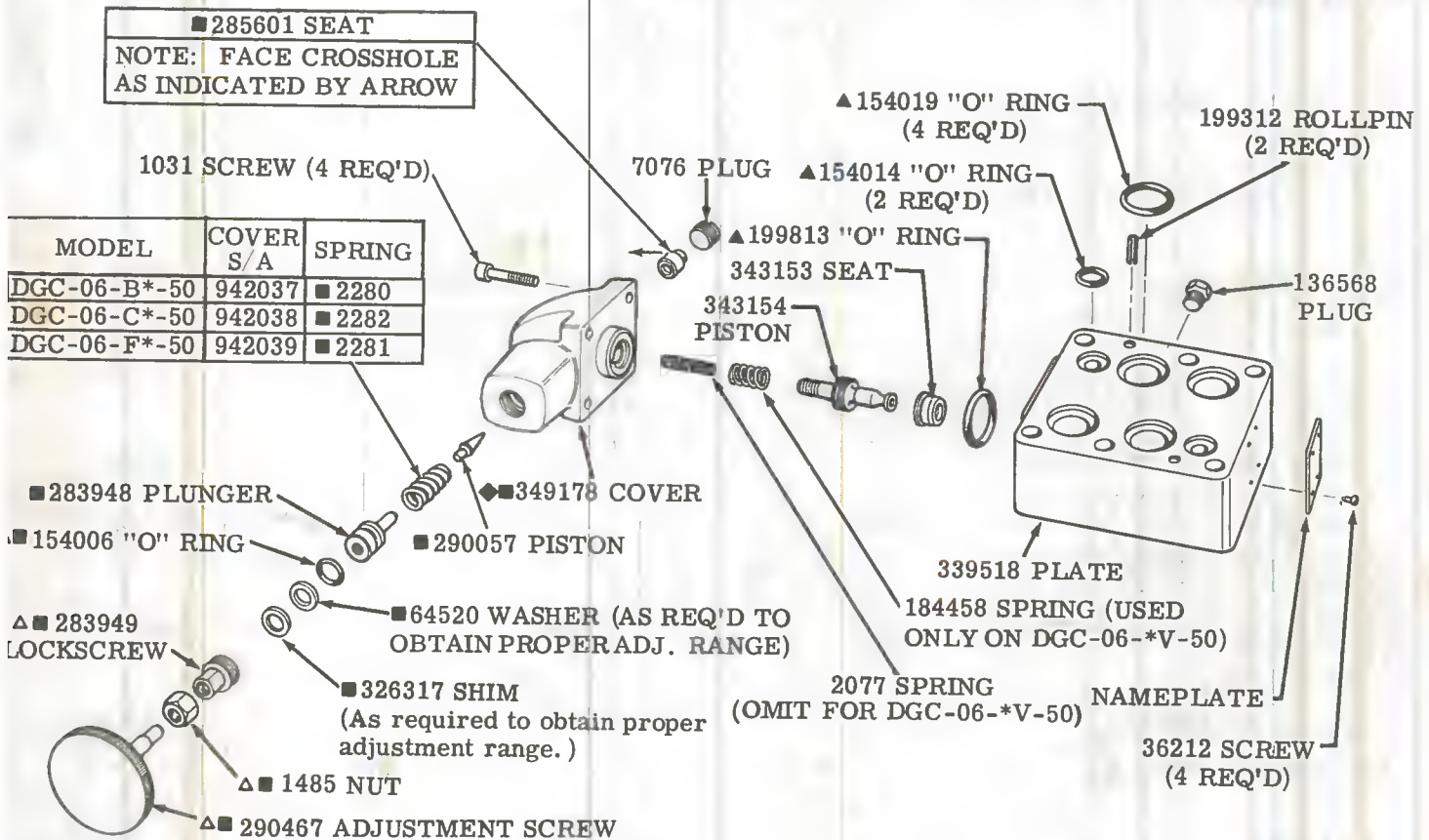
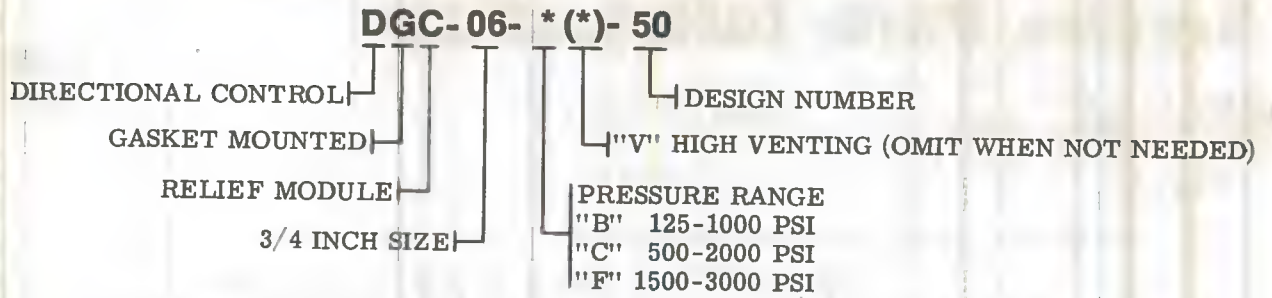
DGSM-01X-10	(3/8 INCH NPT)	ASSY. NO. 234488
DGSM-01Y-10	(1/2 INCH NPT)	ASSY. NO. 221212
DGRXM-01X-50	(3/8 INCH NPT)	ASSY. NO. 347454
DGRXM-01Y-50	(1/2 INCH NPT)	ASSY. NO. 347455

(DGRXM SUBPLATES HAVE THE "Y" PORT)

"R" VALVE MODULES MUST BE MOUNTED DIRECTLY TO A SUBPLATE OR MANIFOLD FOR DRAIN THRU THE "Y" PORT. "X" VALVE MODULES MUST BE DRAINED THRU THE COVER (TYPE "E") OR PORT "B" (TYPE "L") WHEN NOT MOUNTED DIRECTLY TO A SUBPLATE OR MANIFOLD WITH A "Y" DRAIN CONNECTION.

CAUTION
THIS MODULE CANNOT BE USED WITH PRESSURE CENTERED OR DG18 AIR OPERATED VALVES.

MODEL CODE BREAKDOWN



▲ COAT WITH OIL PRIOR TO ASSEMBLY

◆ NOT AVAILABLE FOR SALE AS INDIVIDUAL PART

NOTE
 REFER TO INSTALLATION DRAWING 522650 FOR BOLT KIT INFORMATION AND MODULE STACKING DATA. THE MOUNTING BOLT TORQUE SHOULD NOT EXCEED A MAXIMUM OF 700 IN. LBS.

CAUTION
 THIS MODULE CANNOT BE USED WITH PRESSURE CENTERED OR DG18 AIR OPERATED VALVES.

NOTE
 THE FOLLOWING SUBPLATES MAY BE USED TO MOUNT A 50 SERIES DIRECTIONAL VALVE AND ONE OR MORE MODULAR VALVES:

DGSM-06-50	(3/4 INCH NPT)	ASSY. NO. 280497
DGSM-06X-50	(1 INCH NPT)	ASSY. NO. 280498
DGSM-06Y-50	(1-1/4 INCH NPT)	ASSY. NO. 315213

■ INCLUDED IN COVER S/A

INCLUDED IN 919655 SEAL KIT

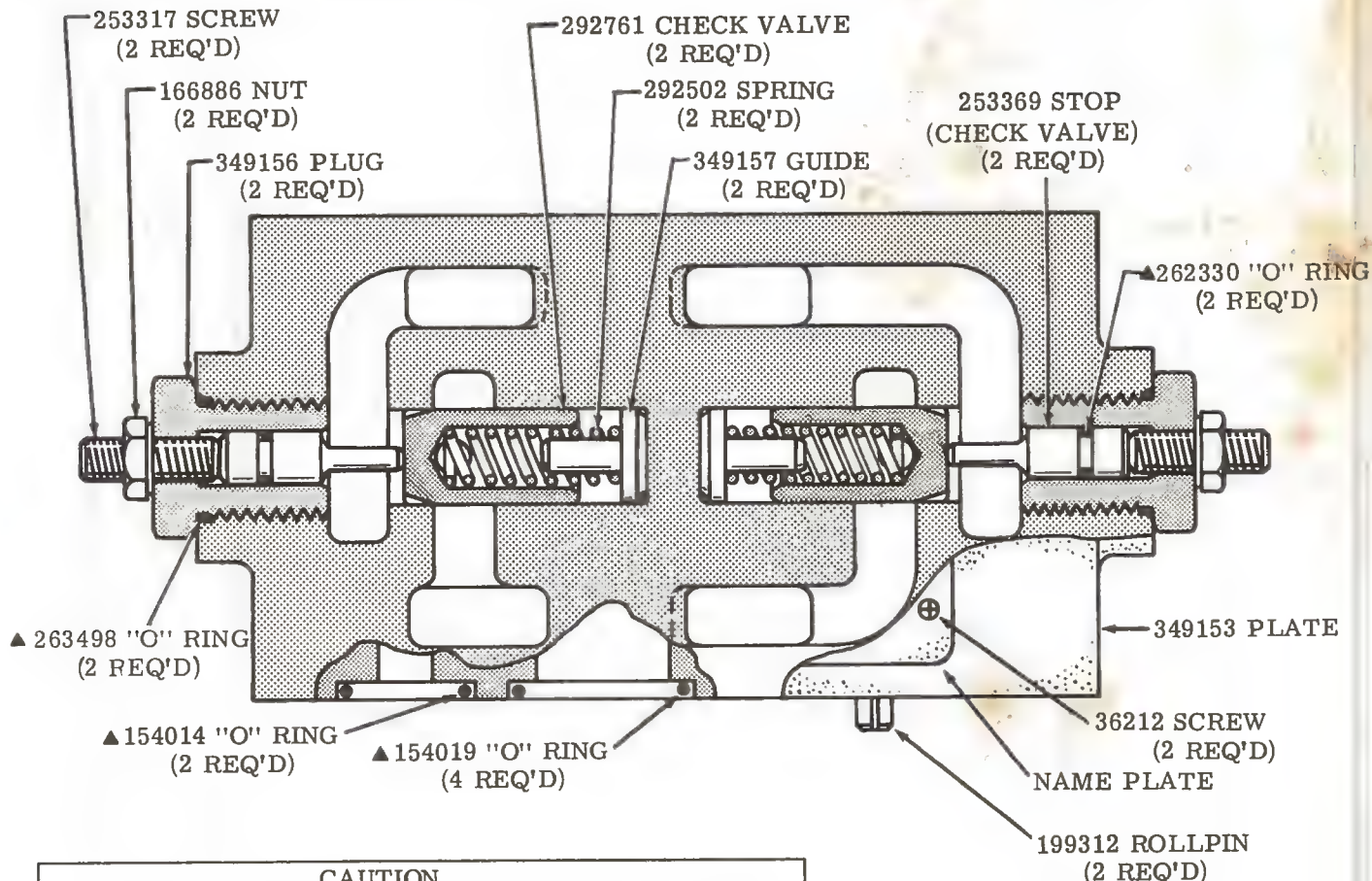
Service Parts Information

MODULAR FLOW REGULATOR VALVES

DGFN-06-50

VICKERS®

A TRIMOVA COMPANY



CAUTION

THIS VALVE CANNOT BE USED WITH PRESSURE CENT-
ERED OR DG-18 AIR OPERATED VALVES.

NOTE

REFER TO INSTALLATION DRAWING 522650 FOR BOLT
KIT INFORMATION AND MODULE STACKING DATA. THE
MOUNTING BOLT TORQUE SHOULD NOT EXCEED A
MAXIMUM OF 700 IN. LBS.

NOTE

THE FOLLOWING SUBPLATES MAY BE USED TO MOUNT
A 60 SERIES DIRECTIONAL VALVE AND ONE OR MORE
MODULAR VALVES:

DGSM-06-50	(3/4 INCH NPT)	ASSY. NO. 280497
DGSM-06X-50	(1 INCH NPT)	ASSY. NO. 280498
DGSM-06Y-50	(1-1/4 INCH NPT)	ASSY. NO. 315213

INCLUDED IN
919646 SEAL KIT

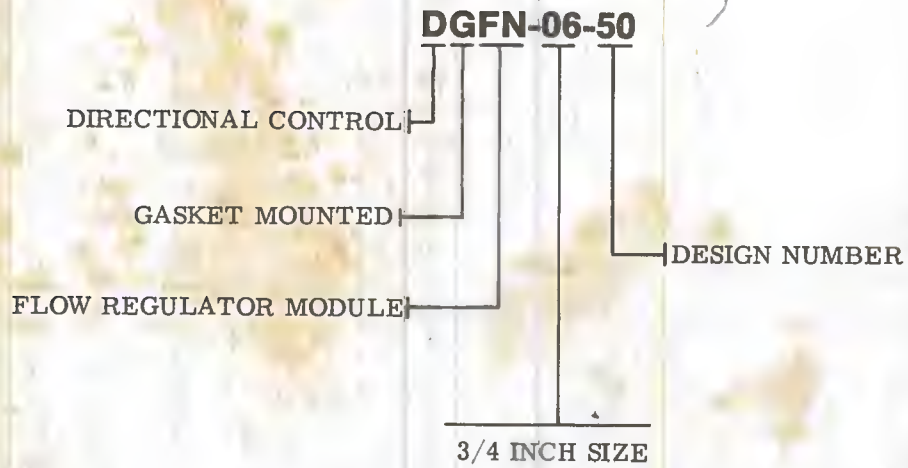
Vickers, Incorporated
P.O. Box 302
Troy, Michigan 48007-0302

Revised 11-1-85

I-3384-S

65

MODEL CODE BREAKDOWN



Service Parts Information

UNLOADING RELIEF VALVES WITH INTEGRAL CHECKS

URG*-06-*-1*

URG*-10-*-1*

VICKERS

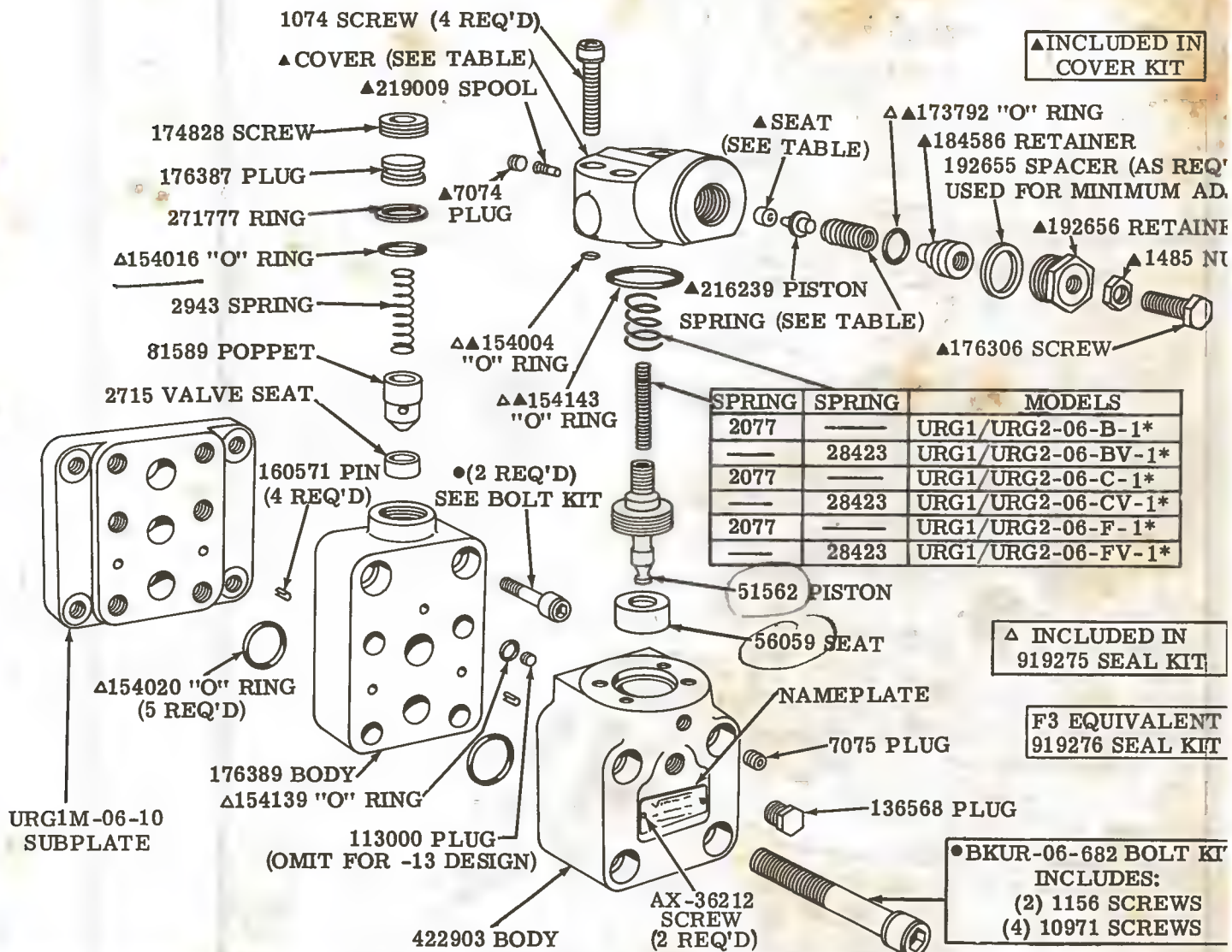
A TRIMONA COMPANY

CAUTION

The URG1-**-*-10/11 and the URG2-**-*-12/13 are internally drained valves. URG1-**-*-12/13 series are externally drained valves and must be provided with a separate drain line from the cover to the reservoir.

MODEL	COVER KIT	COVER	SEAT	SPRING
URG1-06-B-10/11	941924	176388		175071
URG1-06-B-12/13	938626	258330		175072
URG1-06-C-10/11	941925	176388		175073
URG1-06-C-12/13	938627	258330	213946	175071
URG1-06-F-10/11	941926	176388		175072
URG1-06-F-12/13	938628	258330		175073
URG2-06-B-12/13	941924	176388		175071
URG2-06-C-12/13	941925	176388		175072
URG2-06-F-12/13	941926	176388		175073

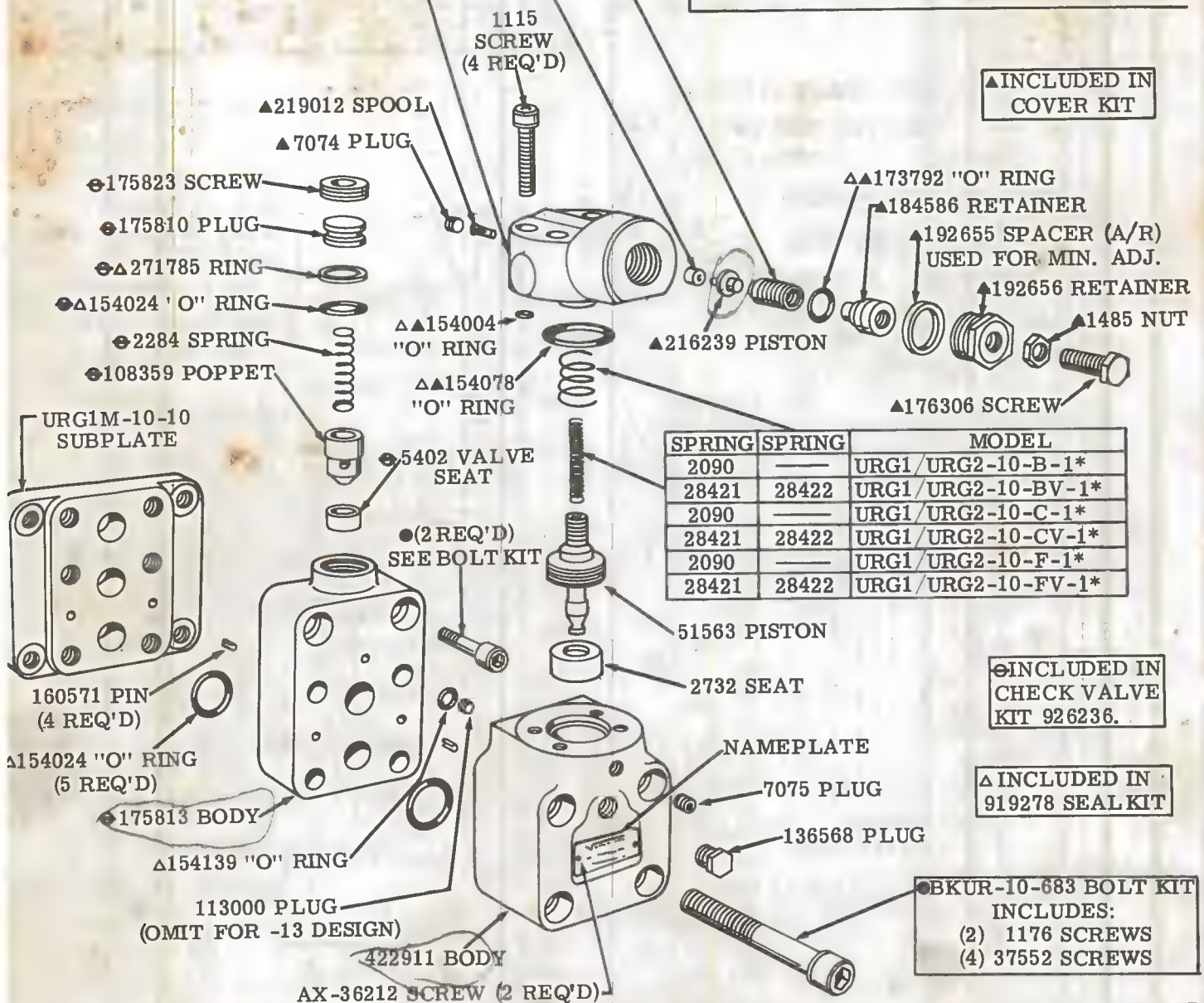
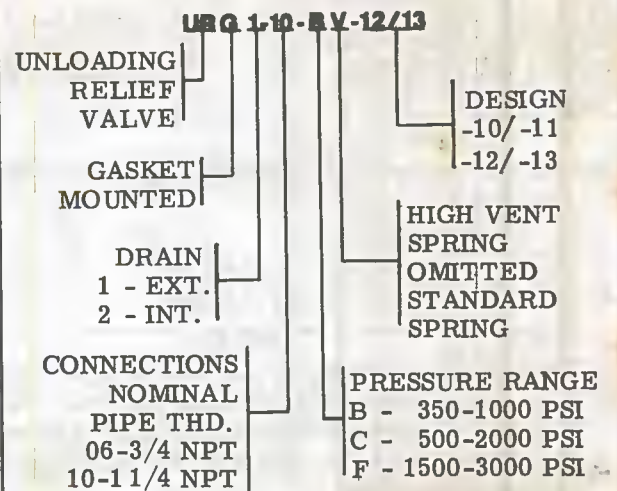
▲ INCLUDED IN
COVER KIT



CAUTION
The URG1-***-10/11 and the UGR2-***-12/13 are internally drained valves. URG1-***-12/13 series are externally drained valves and must be provided with a separate drain line from the cover to the reservoir.

MODEL	COVER KIT	COVER	SEAT	SPRING
URG1-10-B-10/11	941927	175811	213946	175071
URG1-10-B-12/13	938629	258339		
URG1-10-C-10/11	941928	175811		175072
URG1-10-C-12/13	938630	258339		
URG1-10-F-10/11	941929	175811		175073
URG1-10-F-12/13	938631	258339		
URG2-10-B-12/13	941927	175811		175071
URG2-10-C-12/13	941928	175811		175072
URG2-10-F-12/13	941929	175811		175073

MODEL CODE BREAKDOWN



For satisfactory service life of these components in industrial applications, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from Vickers OFP, OFR, and OFRS series are recommended.

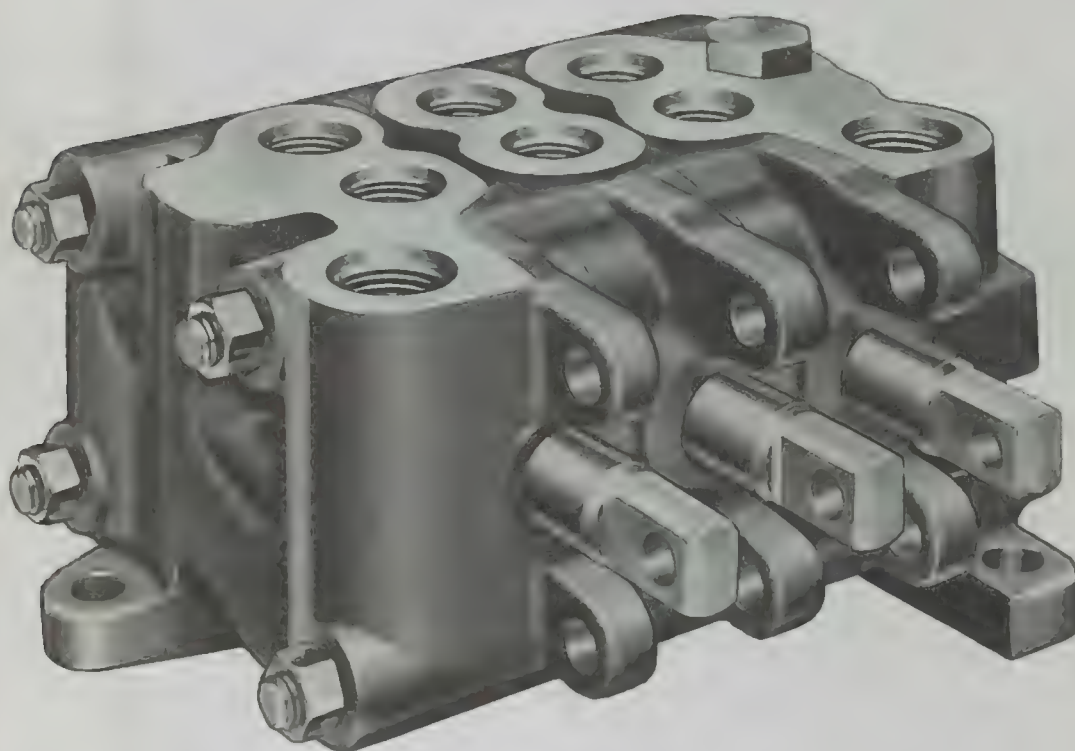
Litho in U. S. A.

VICKERS®
A TRIMBOVA COMPANY

Service Parts Information

**Multiple
Unit
Valves**

CM11 Series -21 Design



Vickers, Incorporated

1401 Crooks Road
Troy, Michigan 48084

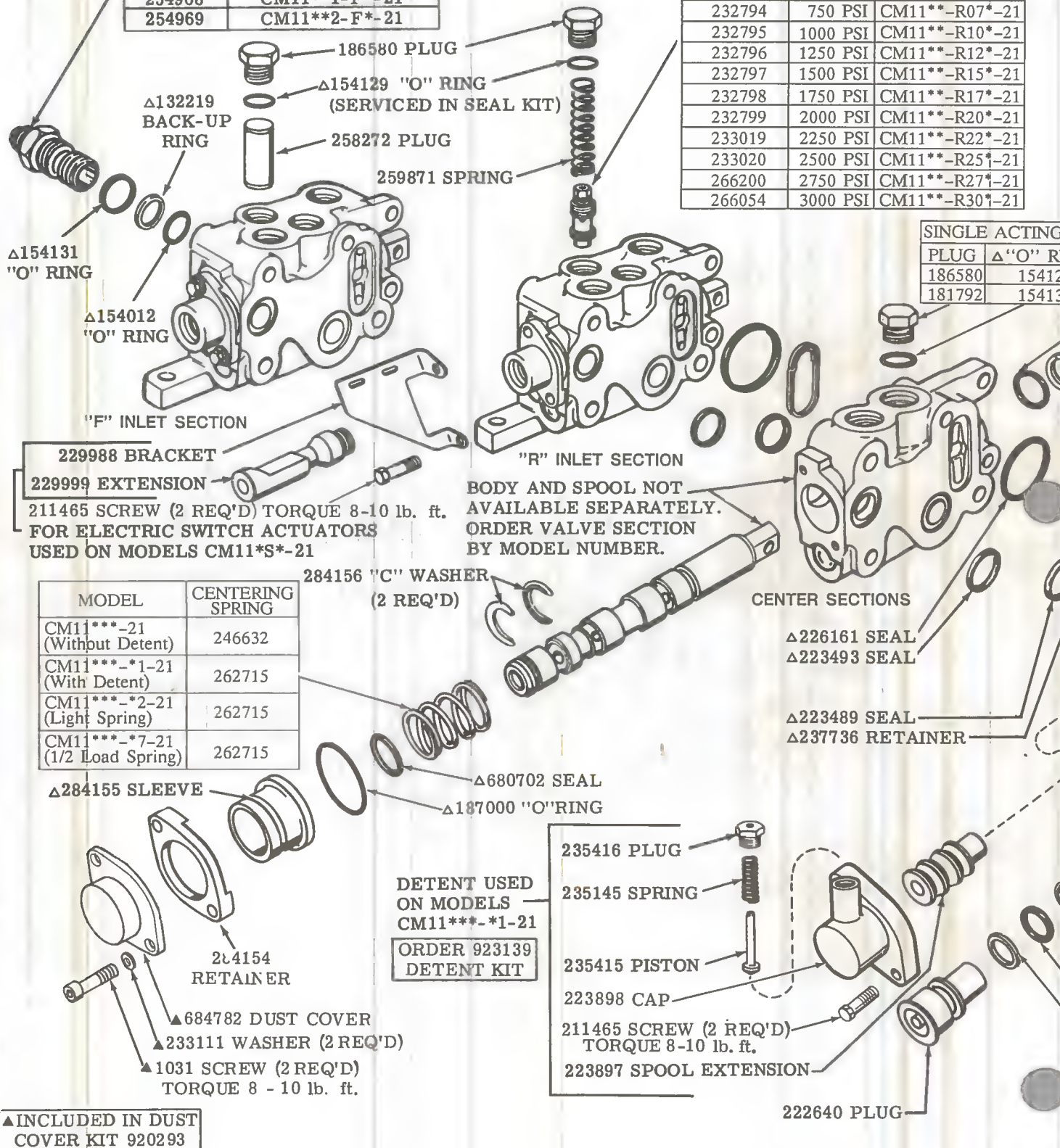
Revised 10-1-87

M-1729-S

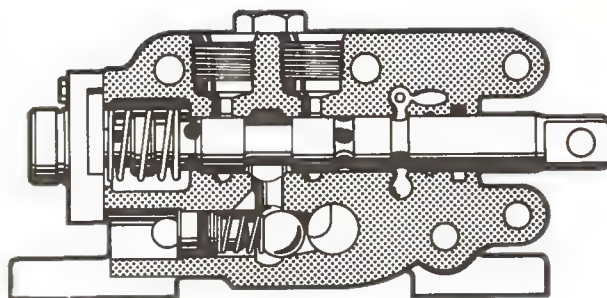
FITTING	PORT CONNECTION
254968	CM11**1-F*-21
254969	CM11**2-F*-21

CONTROL VALVE S/A	RELIEF SETTING	MODEL
233018	500 PSI	CM11**--R05*-21
232794	750 PSI	CM11**--R07*-21
232795	1000 PSI	CM11**--R10*-21
232796	1250 PSI	CM11**--R12*-21
232797	1500 PSI	CM11**--R15*-21
232798	1750 PSI	CM11**--R17*-21
232799	2000 PSI	CM11**--R20*-21
233019	2250 PSI	CM11**--R22*-21
233020	2500 PSI	CM11**--R25*-21
266200	2750 PSI	CM11**--R27*-21
266054	3000 PSI	CM11**--R30*-21

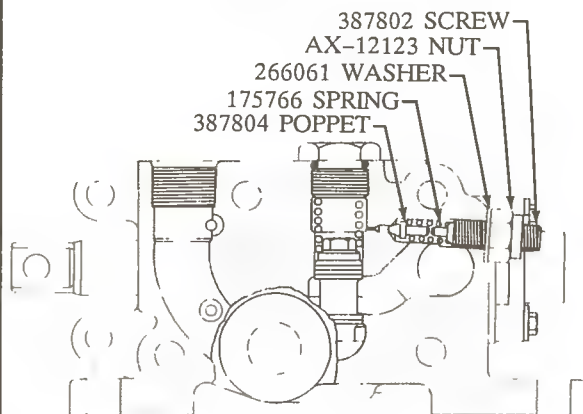
SINGLE ACTING	
PLUG	Δ "O" RING
186580	15412
181792	15413



FULCRUM ROD	OVERALL LENGTH	MODEL	OPERATING SECTIONS
245491	1.766"	CM11-H1-20	1
245492	3.391"	CM11-H2-20	2
245493	4.891"	CM11-H3-20	3
245494	6.391"	CM11-H4-20	4
245495	7.891"	CM11-H5-20	5
245496	9.391"	CM11-H6-20	6
245497	10.891"	CM11-H7-20	7
245498	12.391"	CM11-H8-20	8
245499	13.891"	CM11-H9-20	9
245500	15.391"	CM11-H10-20	10



CM11NO*-R**V** Option

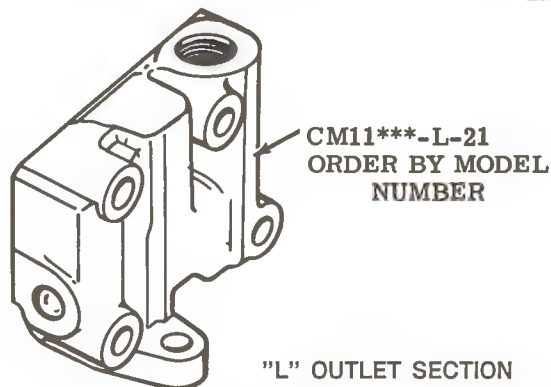
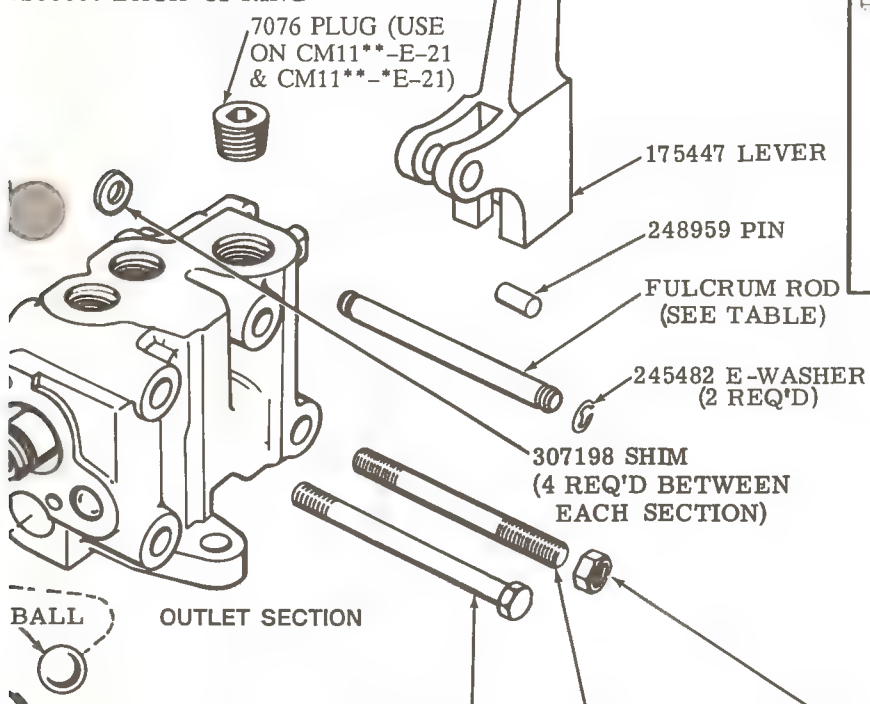


NOTE

Adjust 387802 screw to specified relief setting (V**) and tighten AX-12123 jam nut. (V**) value must be 250 PSI below (R**) value.

IONS (T,W) ONLY
ORT CONNECTIONS
CM11**1-21
CM11**2-21

701 SEAL
286669 BACK-UP RING



ΔINCLUDED IN
920278 SEAL KIT

F3 EQUIVALENT
SEAL KIT 923093

223388 SPRING
154008 "O" RING
Δ271722 BACK-UP RING

SCREW (4 REQ'D)	STUD (4 REQ'D)	OVERALL LENGTH	NUT TORQUE 17 lb.ft.	MODEL	OPERATING SECTIONS
223161			1454	CM11-P1-20	1
223162			(4 REQ'D)	CM11-P2-20	2
	223163	7.38"	1454 (8 REQ'D)	CM11-P3-20	3
	223164	8.88"		CM11-P4-20	4
	223165	10.38"		CM11-P5-20	5
	223166	11.88"		CM11-P6-20	6
	223167	13.38"		CM11-P7-20	7
	223168	14.88"		CM11-P8-20	8
	223169	16.38"		CM11-P9-20	9
	223170	17.88"		CM11-P10-20	10

MODEL CODE BREAKDOWN

CM 11 * * * - * * * V * * * * * - 21

1 2 3 4 5 6 7 8 9 10 11

1 Multiple Unit Control Valve

2 Series

3 Valve Bank Modification

NO - No Modification
 ND - Standard Sections -
 Dust Covers
 NS - Standard Sections -
 Electrical Switch
 Actuators
 ZO - Narrow Bypass Sections
 - No Modification
 ZD - Narrow Bypass Sections
 - Dust Covers
 ZS - Narrow Bypass Sections
 - Electrical Switch
 Actuators

4 Port Connections

1 - 7/8-14 UNF - 2B
 Inlet & Discharge
 Ports -
 3/4-16 UNF - 2B
 Cylinder Ports
 2 - 1 1/16-14 UNF - 2B
 Inlet & Discharge
 Ports -
 7/8-14 UNF - 2B
 Cylinder Ports

5 Inlet Body Type

F - Carryover Port -
 No Relief Valve
 R - Standard - Relief Valve
 (Partial Flow Bypass)
 K - Standard - Relief Valve
 (Full Flow Bypass)
 J - Standard - Relief Valve
 (Partial Flow Bypass)

6 System Relief Valve Setting - PSI

05 - 500 PSI 17 - 1750 PSI
 07 - 750 PSI 20 - 2000 PSI
 10 - 1000 PSI 22 - 2250 PSI
 12 - 1250 PSI 25 - 2500 PSI
 15 - 1500 PSI 27 - 2750 PSI
 30 - 3000 PSI

7 Adjustable System
 Relief Valve Setting - PSI
 (Omit if not required)

V05 - 500 PSI V17 - 1750 PSI
 V07 - 750 PSI V20 - 2000 PSI
 V10 - 1000 PSI V22 - 2250 PSI
 V12 - 1250 PSI V25 - 2500 PSI
 V15 - 1500 PSI

8 Spool Type

A6 - Counterbalance
 B - Motor
 C - Float
 D - Double Acting
 D3 - Dual Function
 D4 - Special Metering
 D5 - Combined &
 B Spool Functions
 T - Single Acting
 W3 - Safety Interlock

9 Spool Modification
 (Omit if not required)

1 - Detent For Any Spool
 2 - Light Centering Spring
 7 - Half Load Centering Spring

10 Outlet Body Type

L - Standard
 E - Carryover Port
 E1 - E Section with
 Additional Outlet Port

11 Design

For satisfactory service life of these components, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from Vickers OFP, OFR and OFRS filter series are recommended.

Litho in U. S. A.

Wb

X

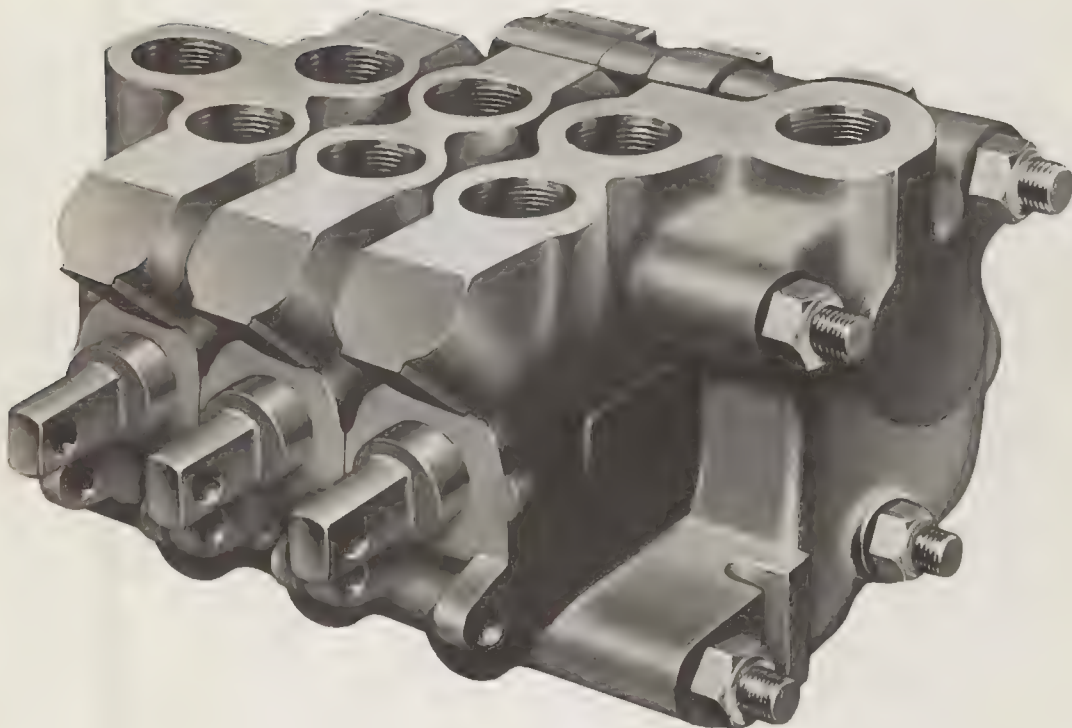
8
25



Service Parts Information

**Multiple
Unit
Valves**

CM2 Series -30 Design



Vickers, Incorporated

1401 Crooks Road
Troy, Michigan 48084

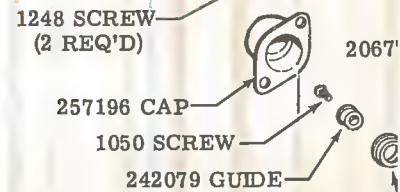
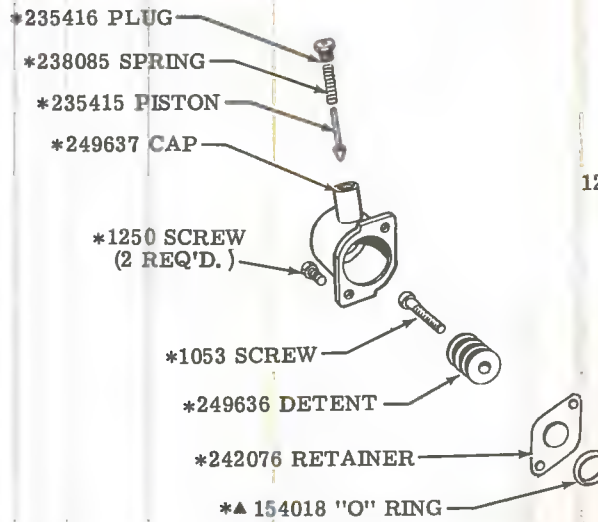
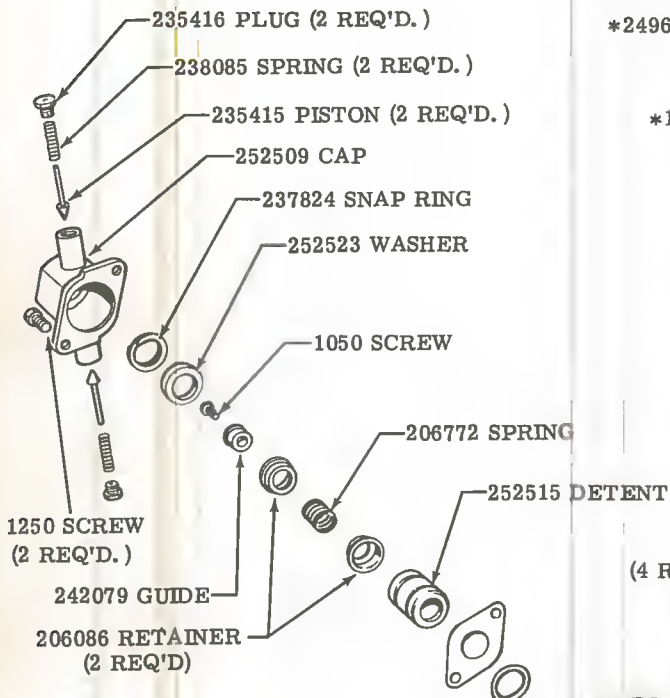
Revised 1-1-88

M-2403-S

SPOOL MODIFICATION

"I" DETENT

"C" SPOOL FLOAT DETENT

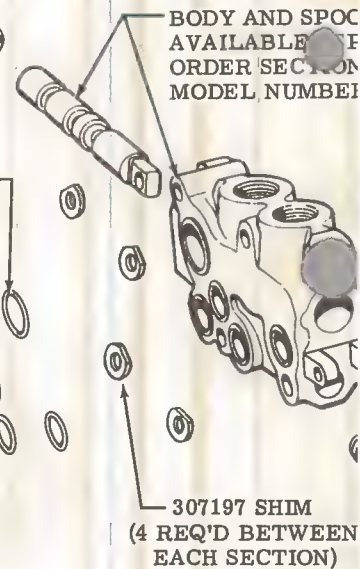


206086 RETAINER—
(2 REQ'D.)

BODY AND SPOC
AVAILABLE
ORDER SECTION
MODEL NUMBER

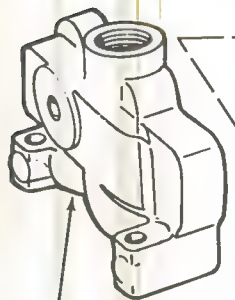
▲ 199815 "O" RING
(1 REQ'D BETWEEN EACH SECTION)

▲ 170441 "O" RING
(4 REQ'D BETWEEN EACH SECTION)



CENTER SECTI

7078 PLUG
("E" SECTIONS ONLY)

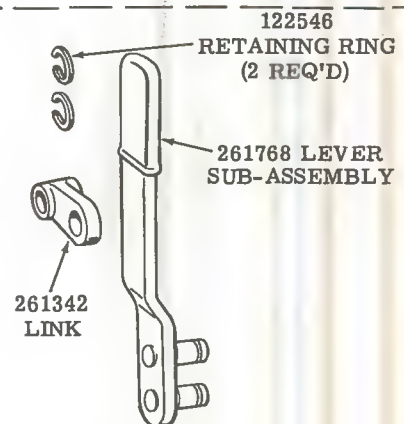


"L" SECTION

OUTLET SECTION

FULCRUM ROD	LENGTH INCHES	OPERATING SECTIONS	LEVER KIT MODEL
262721	2.781	1	CM2-H1-30
262722	5.206	2	CM2-H2-30
262723	7.486	3	CM2-H3-30
262724	9.726	4	CM2-H4-30
262725	11.986	5	CM2-H5-30
262726	14.246	6	CM2-H6-30
262727	16.506	7	CM2-H7-30
262728	18.766	8	CM2-H8-30
262729	21.026	9	CM2-H9-30
262730	23.286	10	CM2-H10-30

BODY	MODEL DESIGNATION
313693	CM2NO1-L-30
313713	CM2NO2-L-30



CONTROL VALVE SUB-ASSY	RELIEF SETTING (PSI)	MODEL DESIGNATION
319693	500	CM2NO*-*05*-30
319694	750	CM2NO*-*07*-30
319695	1000	CM2NO*-*10*-30
319696	1250	CM2NO*-*12*-30
319697	1500	CM2NO*-*15*-30
319698	1750	CM2NO*-*17*-30
319699	2000	CM2NO*-*20*-30
319700	2250	CM2NO*-*22*-30
319701	2500	CM2NO*-*25*-30

STUD KIT MODEL	OPERATING SECTIONS	STUD (4 REQ'D)	LENGTH INCHES
CM2-P1-30	1	280786	5.25
CM2-P2-30	2	242092	5.75
CM2-P3-30	3	242093	8.00
CM2-P4-30	4	242094	10.25
CM2-P5-30	5	242095	12.50
CM2-P6-30	6	242096	14.75
CM2-P7-30	7	242097	17.00
CM2-P8-30	8	242098	19.25
CM2-P9-30	9	242099	21.50
CM2-P10-30	10	242100	23.75

314657 PLUG
("F" SECTION ONLY)

313925 PLUG
("F" SECTION ONLY)

**ANTI-CAVITATION
CHECK VALVE**

516801 PLUG
154130 "O" RING
293258 SPRING
296214 GUIDE
1655 BALL

**ANTI-CAVITATION
CHECK WITH
CYLINDER PORT
RELIEF VALVE**

263632 CAP
154130 "O" RING
263506 SPRING

313868 PLUG
("R" AND "K" SECTIONS ONLY)

▲184197 "O" RING
238834 SPRING

319962 PLUG
("R" SECTION ONLY)

7074 PLUG

267765 PLUG
("F" SECTION ONLY)

1458 NUT (4 REQ'D)
TORQUE 45-50 lb. ft.

**USED WITH CM2NO1-T-30
SPOOL SECTIONS**

194643 PLUG
184197 "O" RING

INLET SECTION

PORT RELIEF VALVE SUB-ASSY	RELIEF SETTING (PSI)	MODEL DESIGNATION
263601	750	CM2NO*-*30-*07
263602	1000	CM2NO*-*30-*10
263603	1250	CM2NO*-*30-*12
263604	1500	CM2NO*-*30-*15
263605	1750	CM2NO*-*30-*17
263606	2000	CM2NO*-*30-*20
263607	2250	CM2NO*-*30-*22
263608	2500	CM2NO*-*30-*25
294688	2750	CM2NO*-*30-*27
263610	3000	CM2NO*-*30-*30
263611	3250	CM2NO*-*30-*32
263612	3500	CM2NO*-*30-*35

CAUTION
THREAD STUDS FULLY
INTO OUTLET SECTION
BEFORE ASSEMBLING
VALVE.

▲154018 "O" RING

242075 POPPET

242789 SPRING

▲154010 "O" RING

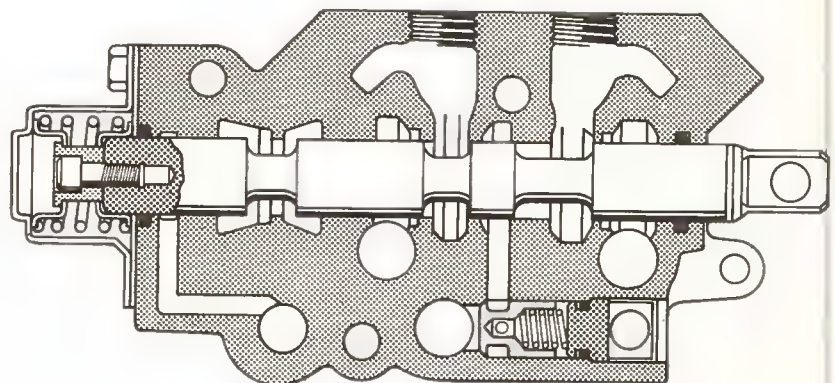
▲287146 BACK-UP RING

242074 PLUG

▲ INCLUDED IN
922926 SEAL KIT

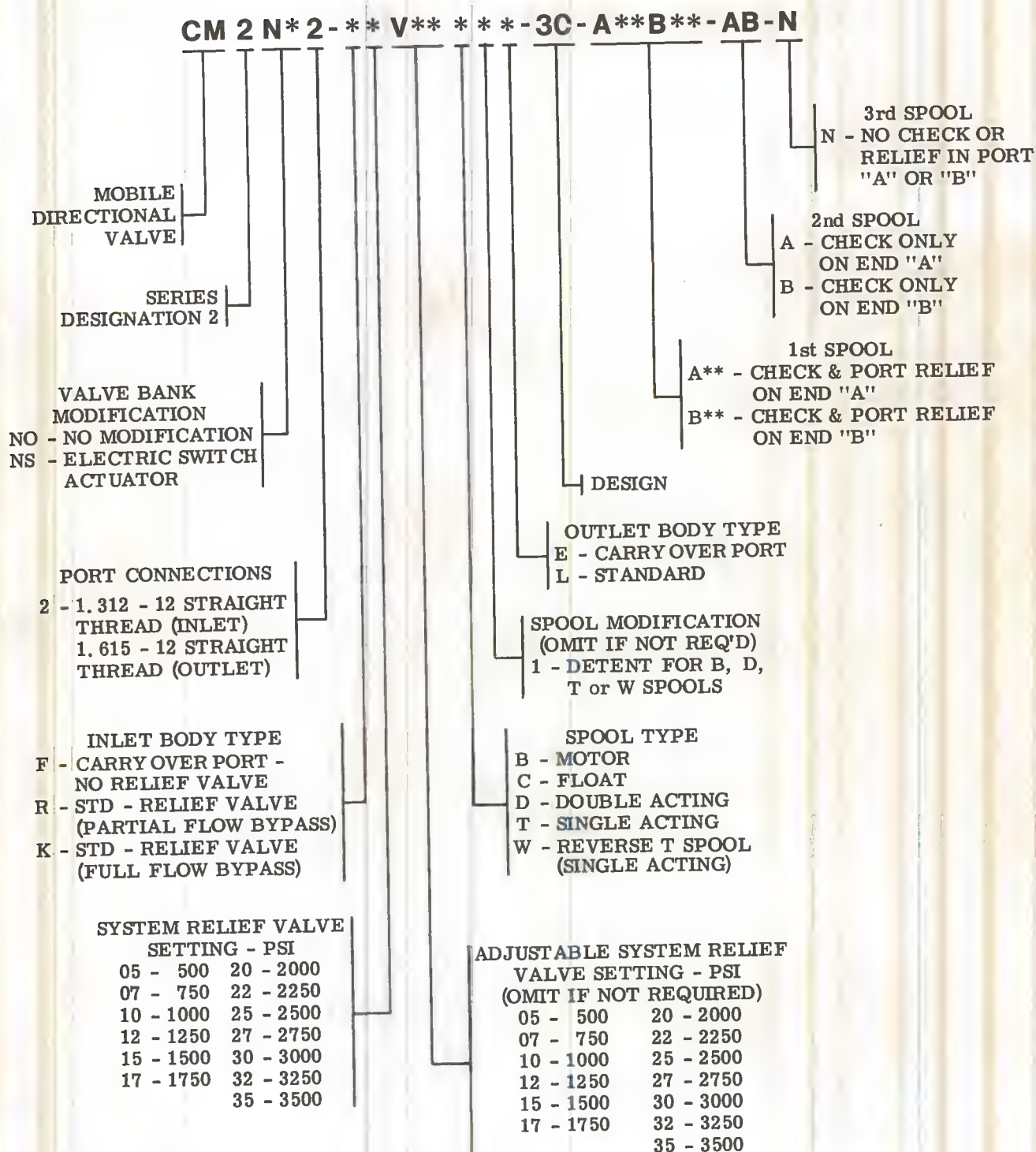
F3 EQUIVALENT
SEAL KIT 920124

*INCLUDED IN 923583
DETENT KIT



ASSEMBLY VIEW

MODEL CODE BREAKDOWN



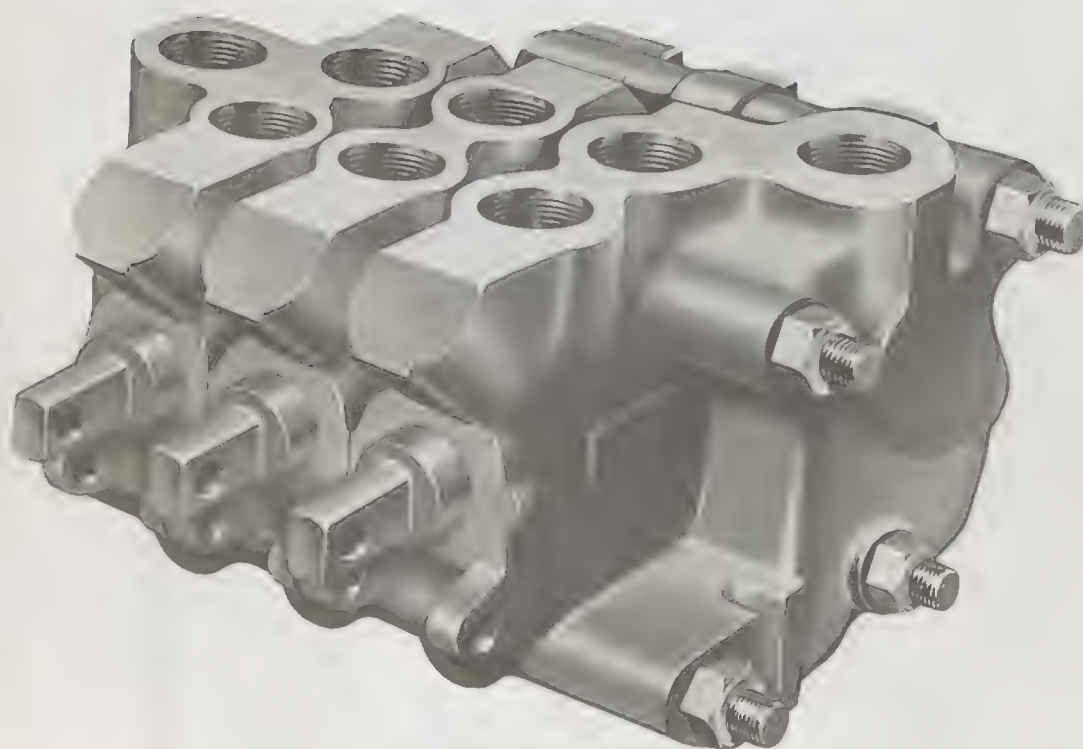
For satisfactory service life of these components, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from Vickers OFP, OFR, and OFRS series are recommended.

VICKERS

Service Parts Information

**Multiple
Unit
Valves**

CM3 Series -30 Design



Vickers, Incorporated

1401 Crooks Road
Troy, Michigan 48064

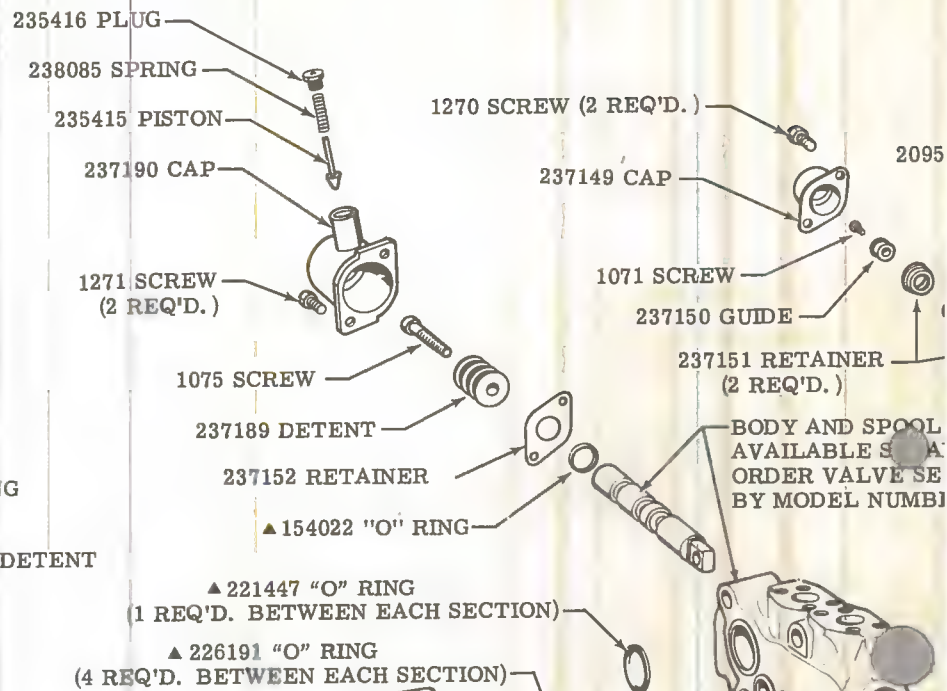
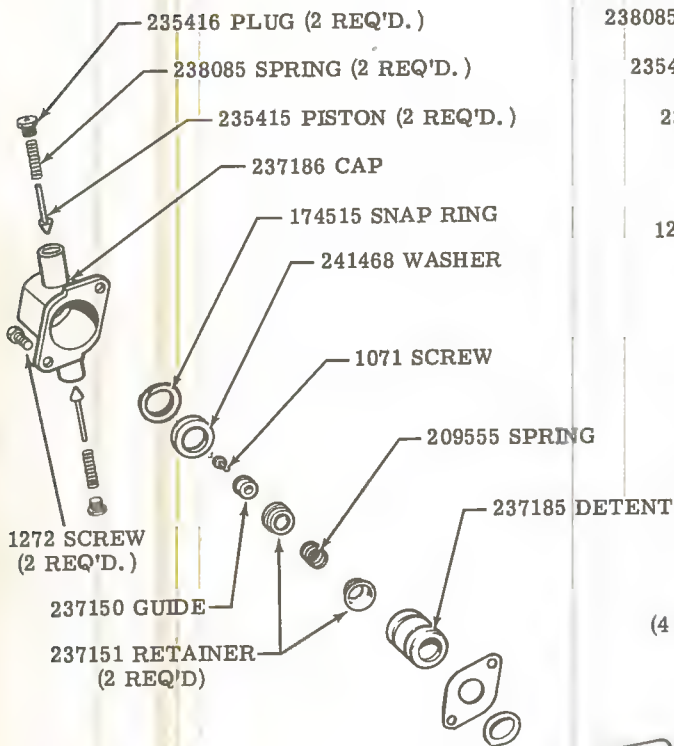
Revised 11-1-86

M-2404-S

SPOOL MODIFICATION

"C" SPOOL FLOAT DETENT

"I" DETENT



7078 PLUG
("E" SECTIONS ONLY)

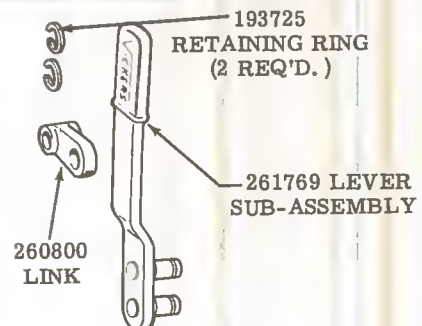
262711 "E" RING
(2 REQ'D.)

OUTLET SECTION

"U" SECTION

CENTER SECTION

"L" SECTION

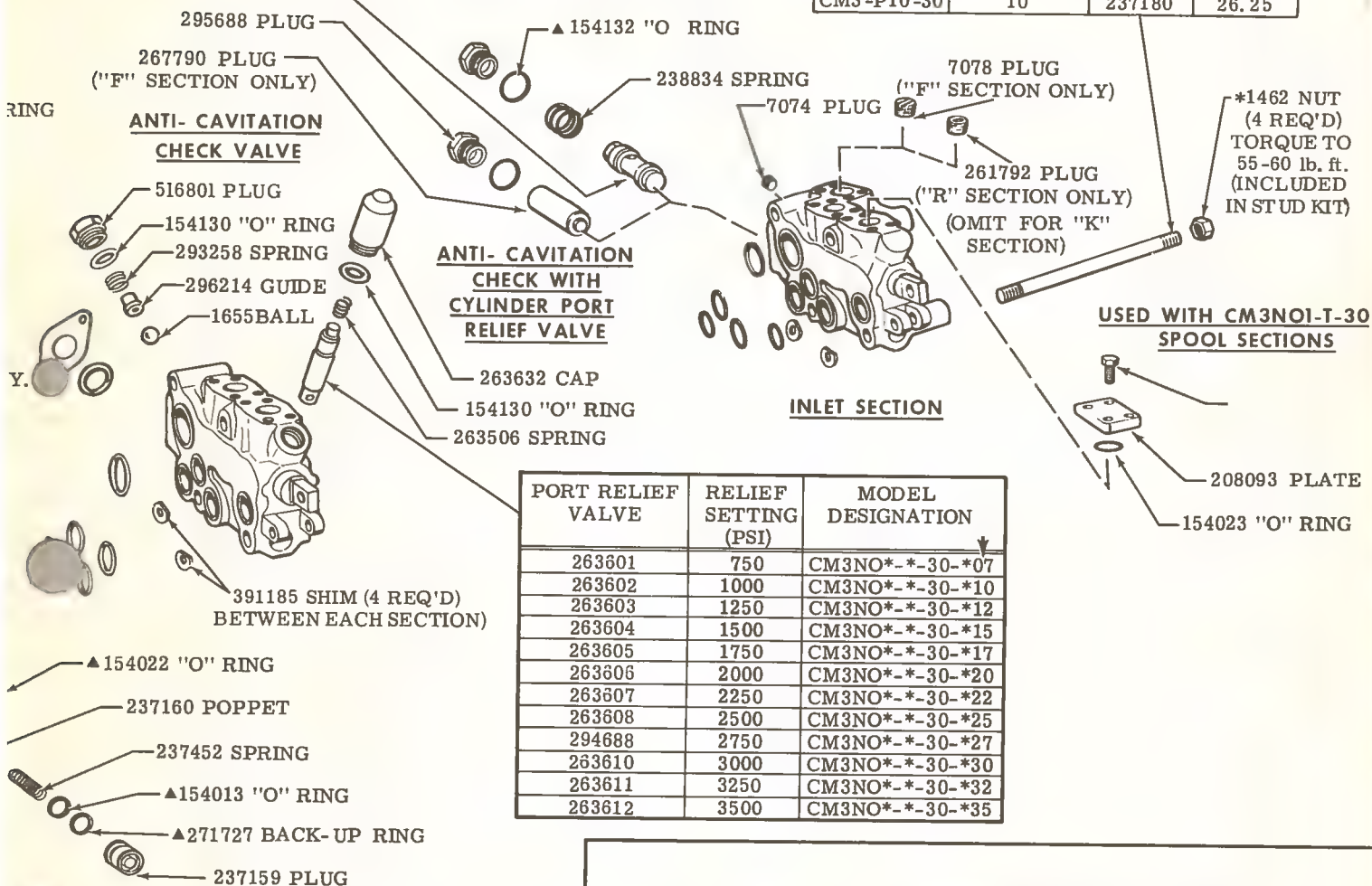


FULCRUM ROD	LENGTH (INCHES)	OPERATING SECTIONS	LEVER KIT MODEL
262721	2.781	1	CM3-H 1-30
263102	5.068	2	CM3-H 2-30
263103	7.568	3	CM3-H 3-30
263104	10.068	4	CM3-H 4-30
263105	12.568	5	CM3-H 5-30
263106	15.068	6	CM3-H 6-30
263107	17.568	7	CM3-H 7-30
263108	20.068	8	CM3-H 8-30
263109	22.568	9	CM3-H 9-30
263110	25.068	10	CM3-H10-30

BODY	MODEL DESIGNATION
313703	CM3NO1-L-30
313733	CM3NO2-L-30
313883	CM3NO4-L-30

CONTROL VALVE SUB-ASSY	RELIEF SETTING (PSI)	MODEL DESIGNATION
233015	500	CM3NO*-*05*-30
232836	750	CM3NO*-*07*-30
232837	1000	CM3NO*-*10*-30
233027	1250	CM3NO*-*12*-30
232838	1500	CM3NO*-*15*-30
232839	1750	CM3NO*-*17*-30
232840	2000	CM3NO*-*20*-30
233016	2250	CM3NO*-*22*-30
233017	2500	CM3NO*-*25*-30

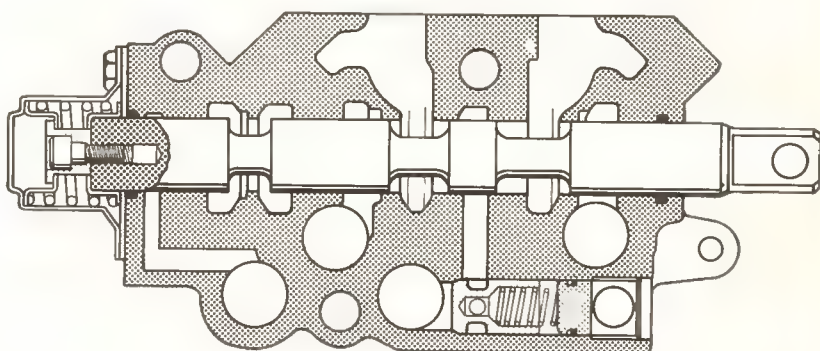
*STUD KIT MODEL	OPERATING SECTIONS	*STUD (4 REQ'D)	LENGTH (INCHES)
CM3-P 1-30	1	280784	5.75
CM3-P 2-30	2	237172	6.25
CM3-P 3-30	3	237173	8.75
CM3-P 4-30	4	237174	11.25
CM3-P 5-30	5	237175	13.75
CM3-P 6-30	6	237176	16.25
CM3-P 7-30	7	237177	18.75
CM3-P 8-30	8	237178	21.25
CM3-P 9-30	9	237179	23.75
CM3-P10-30	10	237180	26.25



PORT RELIEF VALVE	RELIEF SETTING (PSI)	MODEL DESIGNATION
263601	750	CM3NO*-*30-*07
263602	1000	CM3NO*-*30-*10
263603	1250	CM3NO*-*30-*12
263604	1500	CM3NO*-*30-*15
263605	1750	CM3NO*-*30-*17
263606	2000	CM3NO*-*30-*20
263607	2250	CM3NO*-*30-*22
263608	2500	CM3NO*-*30-*25
294688	2750	CM3NO*-*30-*27
263610	3000	CM3NO*-*30-*30
263611	3250	CM3NO*-*30-*32
263612	3500	CM3NO*-*30-*35

* THREAD STUDS FULLY INTO OUT-LET SECTION FIRST, THEN COMPLETE ASSEMBLY OF VALVE.

▲ = SERVICED IN SEAL KIT 922927



SEE SERVICE MANUAL M-2400-S FOR MAINTENANCE INFORMATION

MODEL CODE BREAKDOWN

CM 3 NO 1- * ** ***** 1 *-30-A**B**-**-(**)-N-B22

MULTIPLE UNIT
CONTROL VALVE
MOBILE

SERIES
DESIGNATION

VALVE BANK
MODIFICATION
NO - NO
MODIFICATION

PORT CONNECTIONS
1 - SAE 1 INCH 4-BOLT
FLANGE INLET &
CYLINDERS
SAE 1 1/4 4 - BOLT
FLANGE DISCHARGE

INLET BODY TYPE
F - CARRYOVER PORT - NO
RELIEF VALVE
K - STANDARD - RELIEF (FULL
FLOW BYPASS)
R - STANDARD - RELIEF VALVE
(PARTIAL FLOW BYPASS)

SYSTEM RELIEF
VALVE SETTING (P.S.I.)
05 - 500 12 - 1250 20 - 2000
07 - 750 15 - 1500 22 - 2250
10 - 1000 17 - 1750 25 - 2500

SPOOL TYPE
B - MOTOR
C - FLOAT
D - DOUBLE
ACTING
T - SINGLE
ACTING
U - SERIES
SECTION
(NO SPOOL)

DESIGN NUMBER
30 - 3rd DESIGN

OUTLET BODY TYPE
L - STANDARD
E - CARRYOVER PORT

SPOOL MODIFICATION
(OMIT IF NOT REQUIRED)
1 - DETENT FOR B, D, OR
T SPOOLS

5th SPOOL
B22 - CHECK AND
PORT RELIEF
SET AT 2250
P.S.I. IN "B"
PORT ONLY.
NOTHING IN
PORT "A".

4th SPOOL
N - NO CHECK OR
RELIEF VALVE
IN PORT "A"
OR "B"

3rd SPOOL
A22 - CHECK AND PORT
RELIEF SET AT
2250 P.S.I. ON END
"A".
B - CHECK ONLY ON
END "B"

2nd SPOOL
A - CHECK ONLY ON END "A"
B - CHECK ONLY ON END "B"

1st SPOOL
A** - CHECK AND PORT RELIEF
ON END "A"
B** - CHECK AND PORT RELIEF
ON END "B"
PORT RELIEF SETTING - P.S.I.
07 - 750 17 - 1750 27 - 2750
10 - 1000 20 - 2000 30 - 3000
12 - 1250 22 - 2250 32 - 3250
15 - 1500 25 - 2500 35 - 3500

For satisfactory service life of these components, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from Vickers OFF, OFR, and OFRS series are recommended.

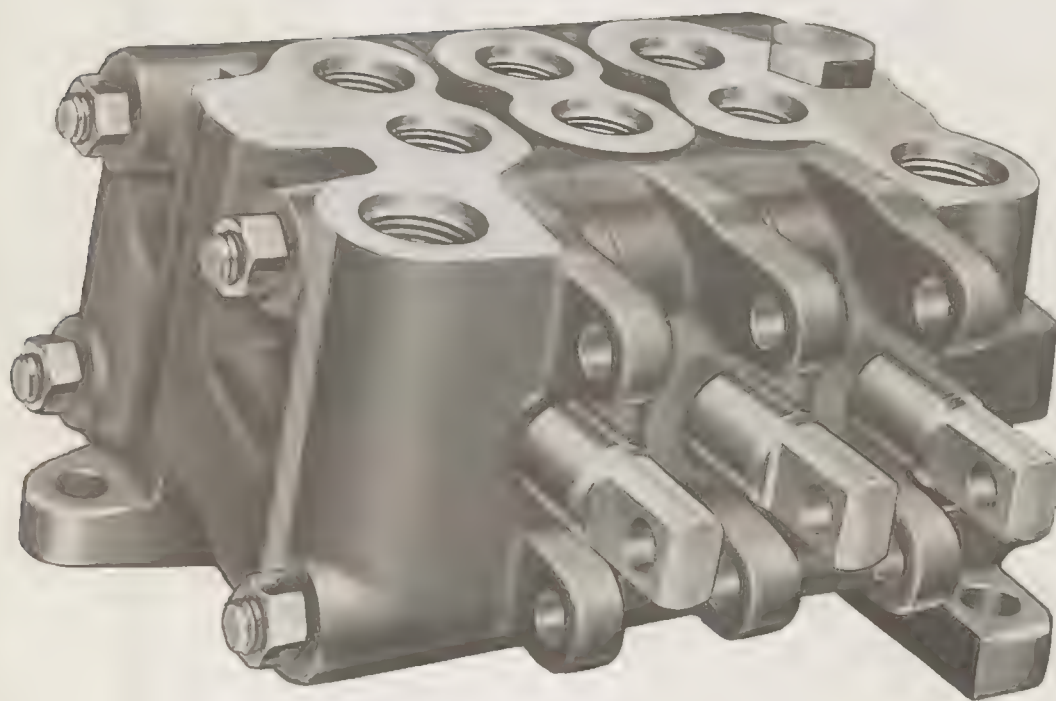
Litho in U.S.A.

X 35

Service Parts Information

**Multiple
Unit
Valves**

CM11 Series -21 Design



Vickers, Incorporated

1401 Crooks Road
Troy, Michigan 48084

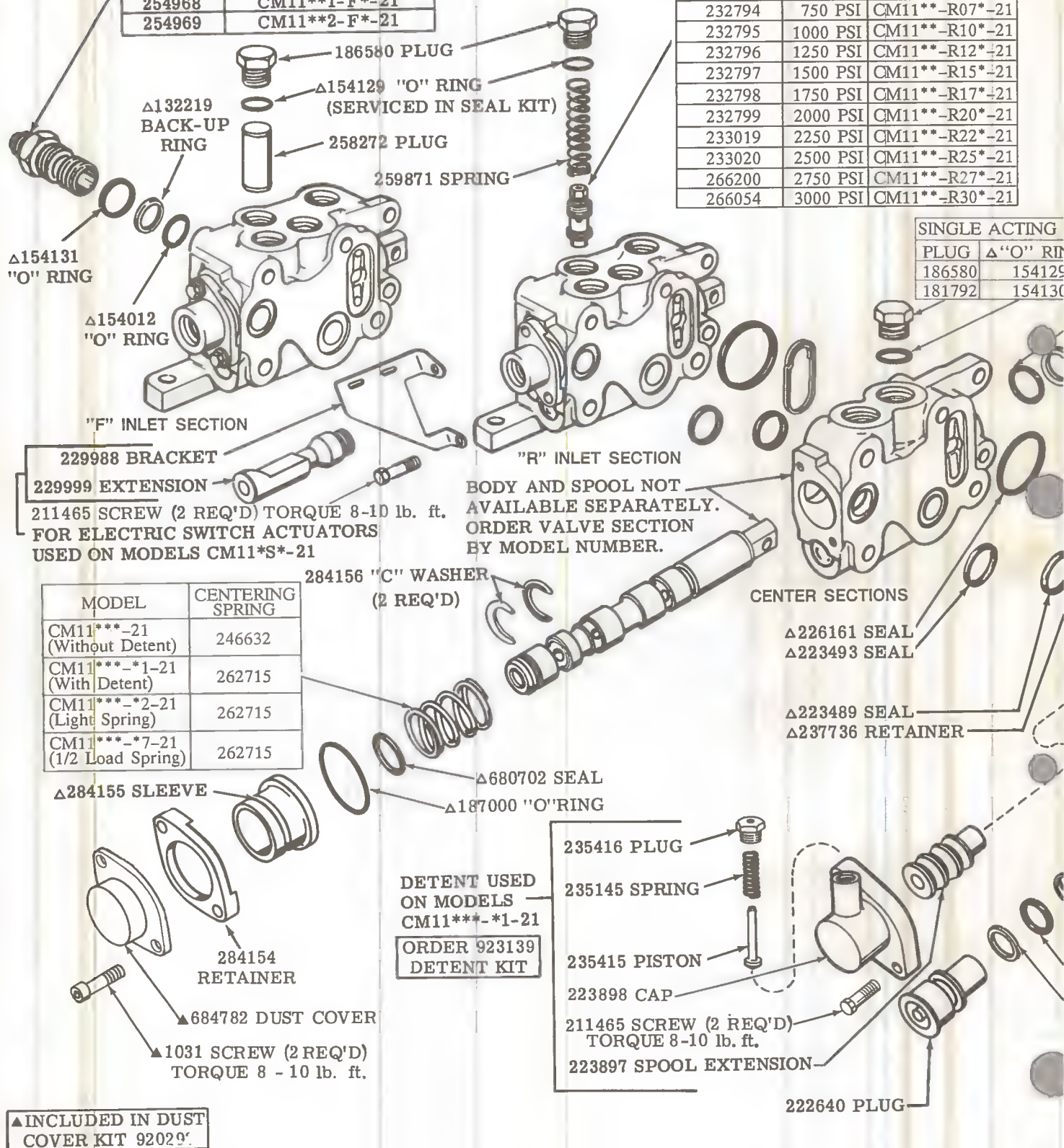
Revised 5-1-87

M-1729-S

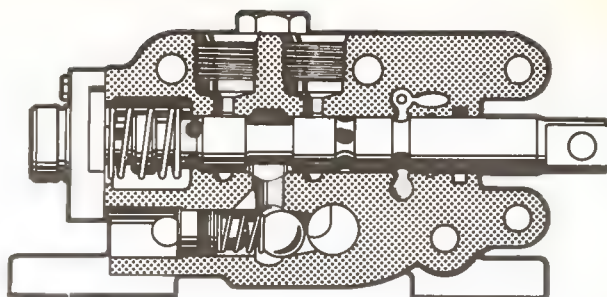
FITTING	PORT CONNECTION
254968	CM11**1-F*-21
254969	CM11**2-F*-21

CONTROL VALVE S/A	RELIEF SETTING	MODEL
233018	500 PSI	CM11**-R05*-21
232794	750 PSI	CM11**-R07*-21
232795	1000 PSI	CM11**-R10*-21
232796	1250 PSI	CM11**-R12*-21
232797	1500 PSI	CM11**-R15*-21
232798	1750 PSI	CM11**-R17*-21
232799	2000 PSI	CM11**-R20*-21
233019	2250 PSI	CM11**-R22*-21
233020	2500 PSI	CM11**-R25*-21
266200	2750 PSI	CM11**-R27*-21
266054	3000 PSI	CM11**-R30*-21

SINGLE ACTING	
PLUG	Δ"O" RING
186580	154129
181792	154130

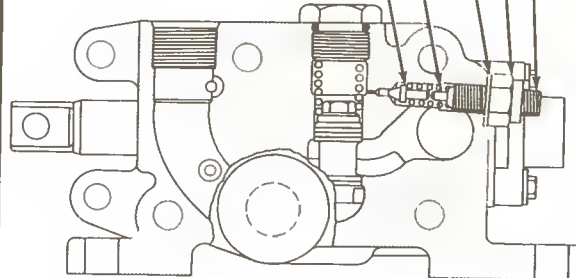


FULCRUM ROD	OVERALL LENGTH	MODEL	OPERATING SECTIONS
245491	1.766"	CM11-H1-20	1
245492	3.391"	CM11-H2-20	2
245493	4.891"	CM11-H3-20	3
245494	6.391"	CM11-H4-20	4
245495	7.891"	CM11-H5-20	5
245496	9.391"	CM11-H6-20	6
245497	10.891"	CM11-H7-20	7
245498	12.391"	CM11-H8-20	8
245499	13.891"	CM11-H9-20	9
245500	15.391"	CM11-H10-20	10



CM11NO*-R**V** Option

- 387802 SCREW
- AX-12123 NUT
- 266061 WASHER
- 175766 SPRING
- 387804 POPPET

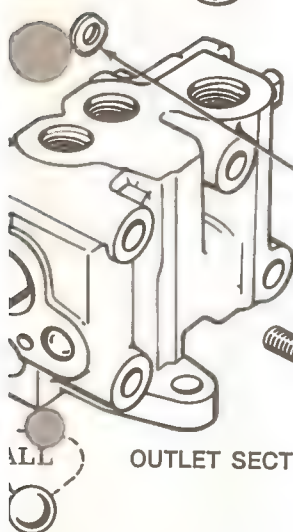


NOTE
Adjust 387802 screw to specified relief setting (V**) and tighten AX-12123 jam nut. (V**) value must be 250 PSI below (R**) value.

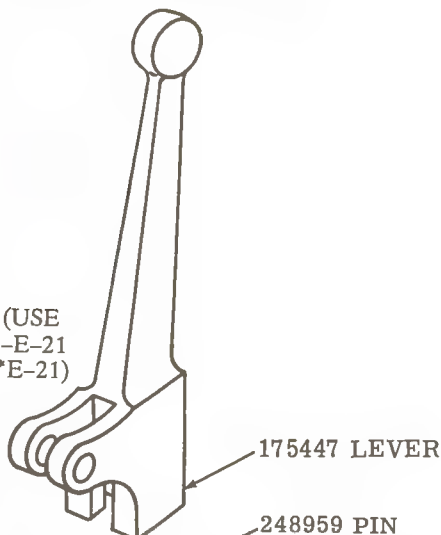
ONS (T,W) ONLY
RT CONNECTIONS
CM11**1-21
CM11**2-21

01 SEAL
8009 BACK-UP RING

7076 PLUG (USE
ON CM11**-E-21
& CM11**-*E-21)



OUTLET SECTION



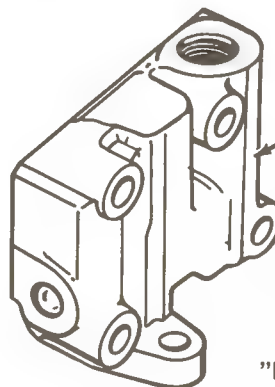
175447 LEVER

248959 PIN

FULCRUM ROD
(SEE TABLE)

245482 E-WASHER
(2 REQ'D)

307198 SHIM
(4 REQ'D BETWEEN
EACH SECTION)



CM11***-L-21
ORDER BY MODEL
NUMBER

"L" OUTLET SECTION

ΔINCLUDED IN
920278 SEAL KIT

F3 EQUIVALENT
SEAL KIT 923093

223388 SPRING
4008 "O" RING
71722 BACK-UP RING

SCREW (4 REQ'D)	STUD (4 REQ'D)	OVERALL LENGTH	NUT TORQUE 17 lb. ft.	MODEL	OPERATING SECTIONS
146835			1454	CM11-P1-20	1
214672			(4 REQ'D)	CM11-P2-20	2
	223153	7.38"	1454 (8 REQ'D)	CM11-P3-20	3
	223154	8.88"		CM11-P4-20	4
	223155	10.38"		CM11-P5-20	5
	223156	11.88"		CM11-P6-20	6
	223157	13.38"		CM11-P7-20	7
	223158	14.88"		CM11-P8-20	8
	223159	16.38"		CM11-P9-20	9
	223160	17.88"		CM11-P10-20	10

MODEL CODE BREAKDOWN

CM 11 * * * - * * * V * * * * * - 21

1
2
3
4
5
6
7
8
9
10
11

1 Multiple Unit Control Valve

2 Series

3 Valve Bank Modification

NO - No Modification
 ND - Standard Sections -
 Dust Covers
 NS - Standard Sections -
 Electrical Switch
 Actuators
 ZO - Narrow Bypass Sections
 - No Modification
 ZD - Narrow Bypass Sections
 - Dust Covers
 ZS - Narrow Bypass Sections
 - Electrical Switch
 Actuators

4 Port Connections

1 - 7/8-14 UNF - 2B
 Inlet & Discharge
 Ports -
 3/4-16 UNF - 2B
 Cylinder Ports
 2 - 1 1/16-14 UNF - 2B
 Inlet & Discharge
 Ports -
 7/8-14 UNF - 2B
 Cylinder Ports

5 Inlet Body Type

F - Carryover Port -
 No Relief Valve
 R - Standard - Relief Valve
 (Partial Flow Bypass)
 K - Standard - Relief Valve
 (Full Flow Bypass)
 J - Standard - Relief Valve
 (Partial Flow Bypass)

6 System Relief Valve Setting - PSI

05 - 500 PSI	17 - 1750 PSI
07 - 750 PSI	20 - 2000 PSI
10 - 1000 PSI	22 - 2250 PSI
12 - 1250 PSI	25 - 2500 PSI
15 - 1500 PSI	27 - 2750 PSI
	30 - 3000 PSI

7 Adjustable System
Relief Valve Setting - PSI
(Omit if not required)

V05 - 500 PSI	V17 - 1750 PSI
V07 - 750 PSI	V20 - 2000 PSI
V10 - 1000 PSI	V22 - 2250 PSI
V12 - 1250 PSI	V25 - 2500 PSI
V15 - 1500 PSI	

8 Spool Type

A6 - Counterbalance
 B - Motor
 C - Float
 D - Double Acting
 D3 - Dual Function
 D4 - Special Metering
 D5 - Combined &
 B Spool Functions
 T - Single Acting
 W3 - Safety Interlock

9 Spool Modification
(Omit if not required)

1 - Detent For Any Spool
 2 - Light Centering Spring
 7 - Half Load Centering Spring

10 Outlet Body Type

L - Standard
 E - Carryover Port
 E1 - E Section with
 Additional Outlet Port

11 Design

For satisfactory service life of these components, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from Vickers OFP, OFR and OFRS filter series are recommended.



Service Parts Information

**Power Match™
Directional
Valve With
Load Sensing
& Pressure
Compensation**

CMX400 -10 Design



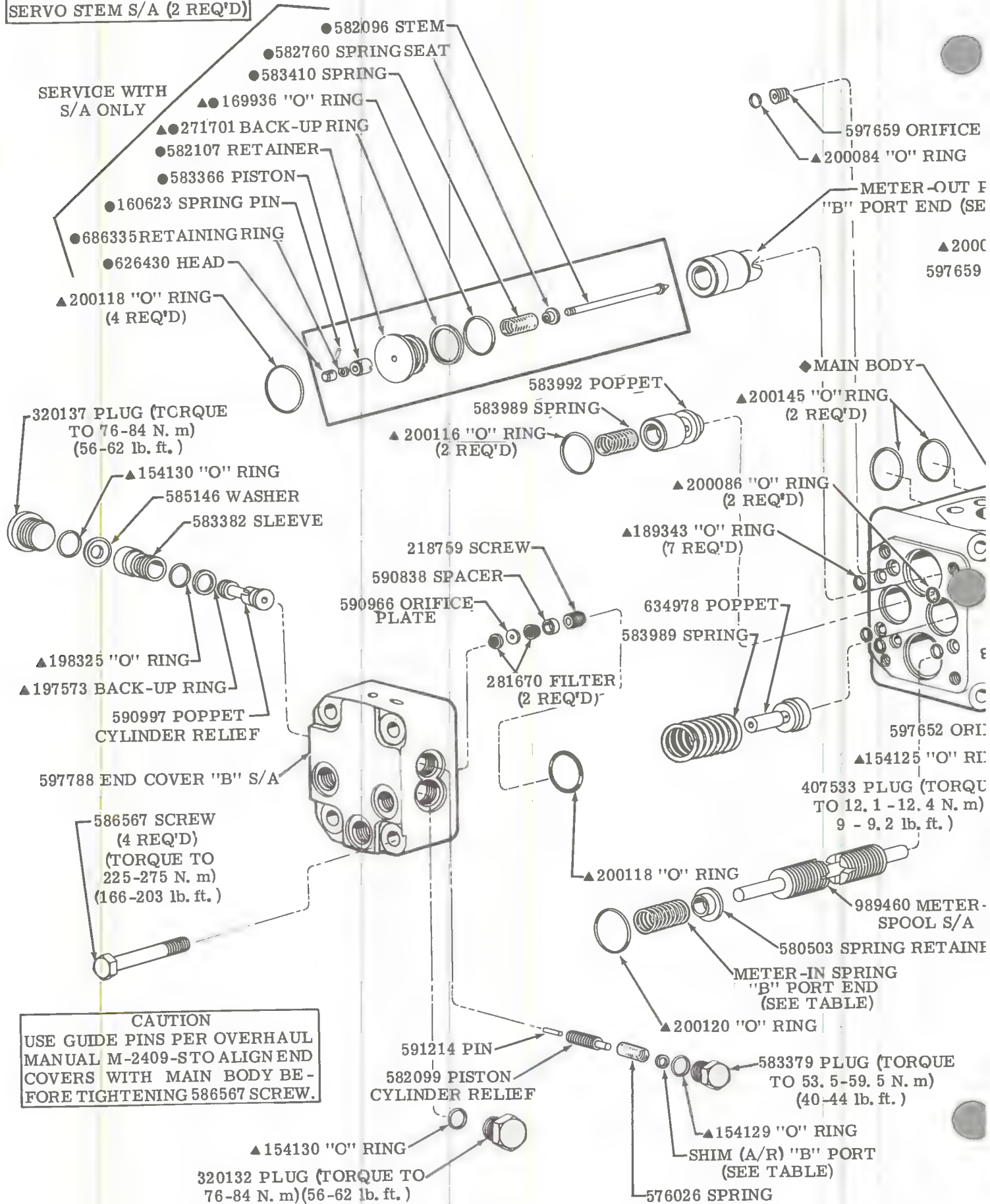
Vickers, Incorporated

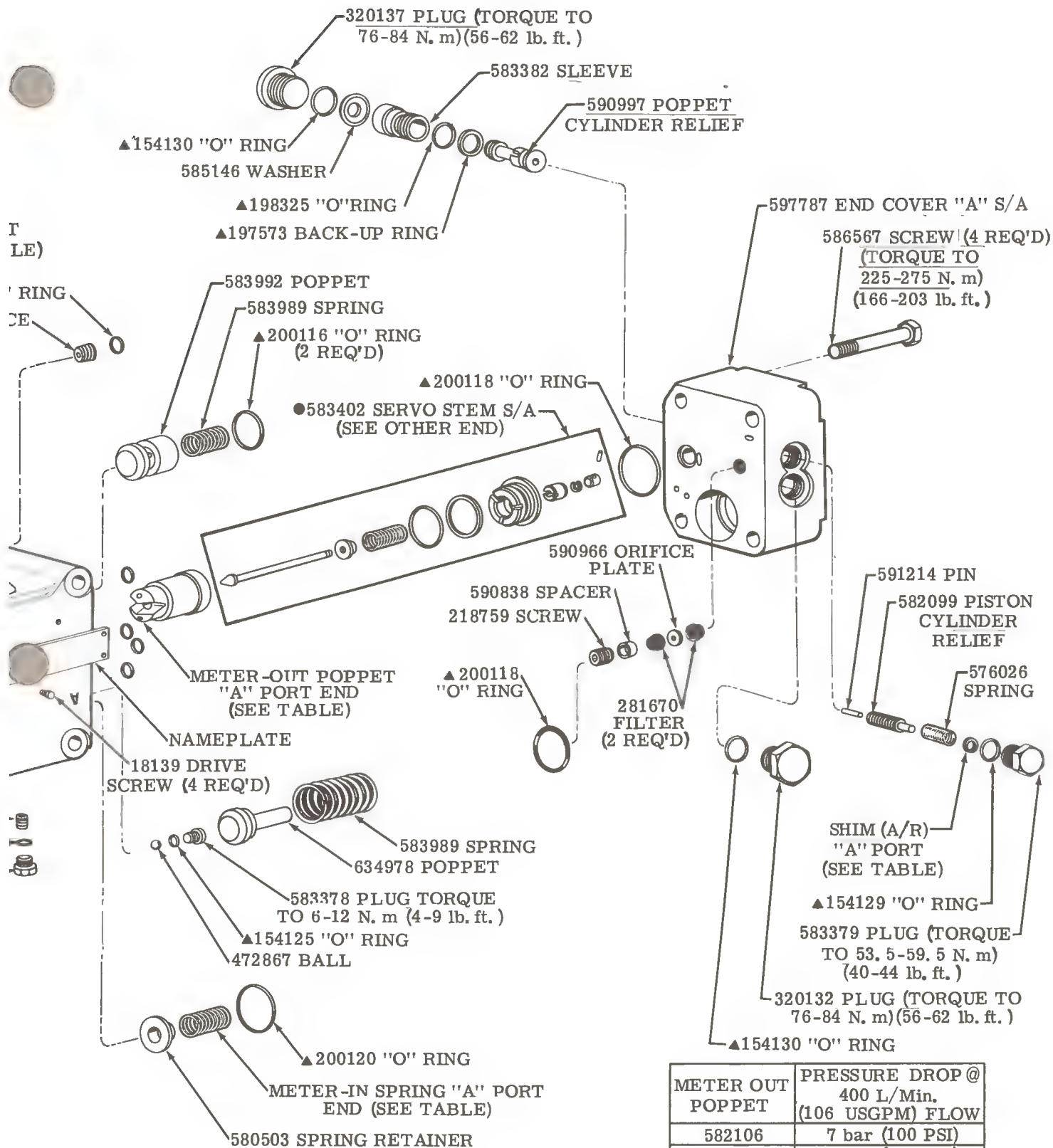
1401 Crooks Road
Troy, Michigan 48064

Revised 12-1-87

M-2406-S

● INCLUDED IN 583402
SERVO STEM S/A (2 REQ'D)





▲ INCLUDED IN
920231 SEAL KIT

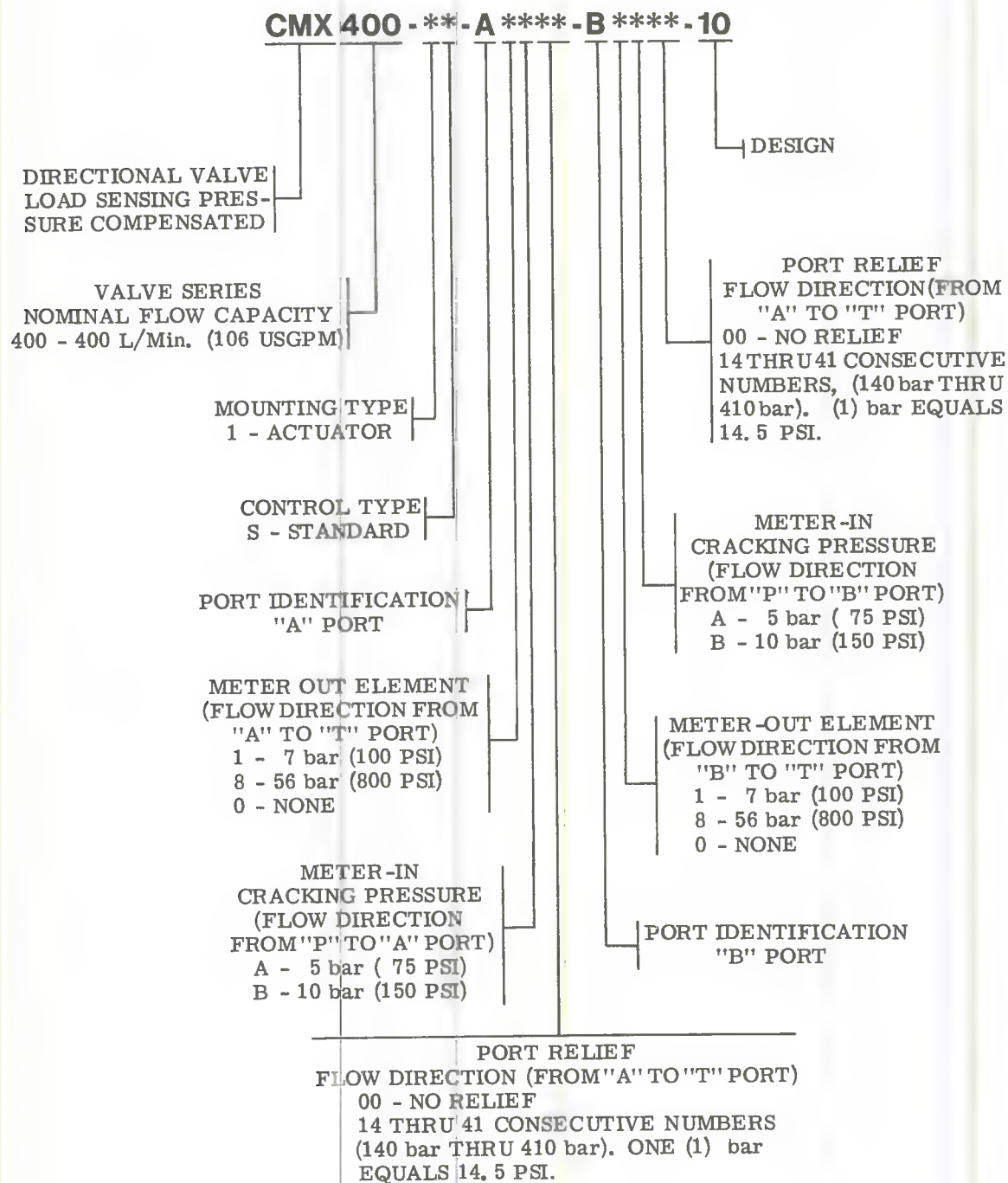
◆ NOT AVAILABLE
AS A SERVICE PART

METER IN SPRING		
SPRING	PORT	CRACKING PRESSURE
583411	A and/or B	5 bar (75 PSI)
583409	A and/or B	10 bar (150 PSI)

METER OUT POPPET	PRESSURE DROP @ 400 L/Min. (106 USGPM) FLOW
582106	7 bar (100 PSI)
583405	55 bar (800 PSI)

SHIMS - CYLINDER RELIEF			
THICKNESS		SHIM KIT	APPROXIMATE ΔP PER SHIM
mm	inch		
0.13	.005	941385	6.9 bar (100 PSI)
0.25	.010		13.8 bar (200 PSI)
0.76	.030		41.4 bar (800 PSI)

MODEL CODE BREAKDOWN



For satisfactory service life of these components, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from Vickers OFP, OFR, and OFRS series are recommended.

Litho in U. S. A.



Service Parts Information

**Power Match™
Directional
Valve With
Load Sensing
& Pressure
Compensation**

CMX250 -10 Design



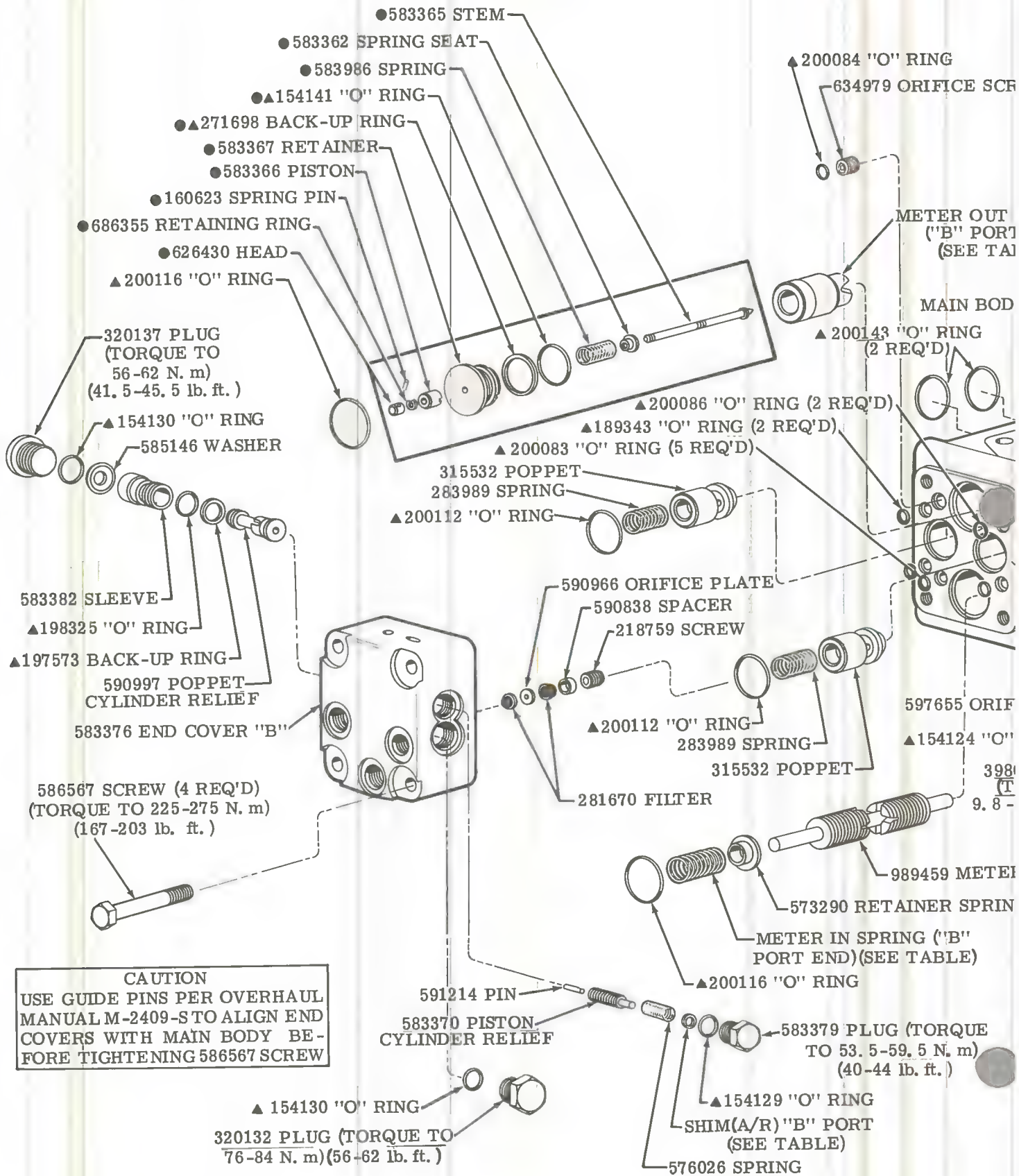
Vickers, Incorporated

1401 Crooks Road
Troy, Michigan 48064

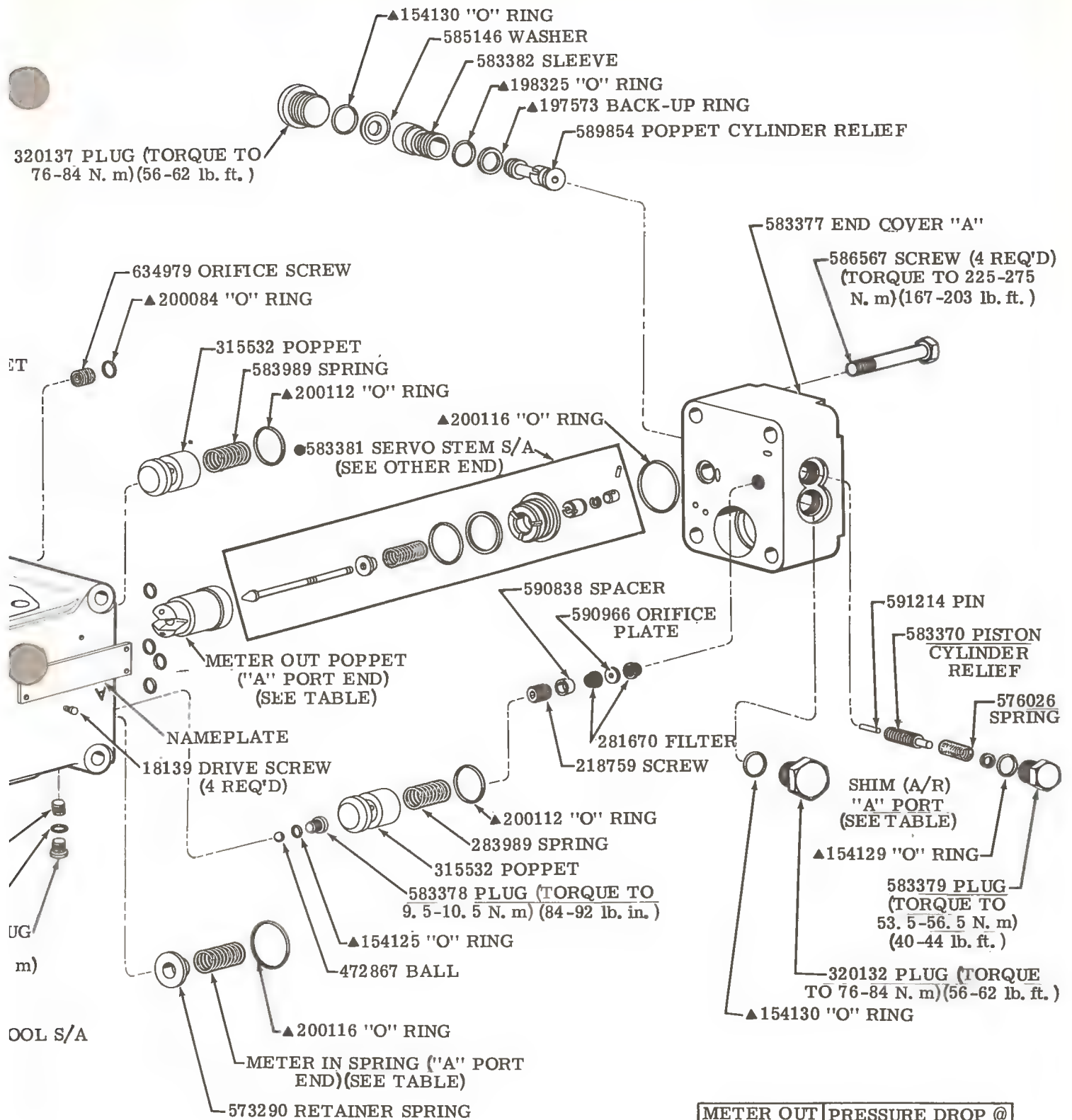
Revised 12-1-87

M-2405-S

●PARTS AVAILABLE ONLY
IN 583381 SERVO STEM S/A
2 REQ'D



CAUTION
USE GUIDE PINS PER OVERHAUL
MANUAL M-2409-S TO ALIGN END
COVERS WITH MAIN BODY BE-
FORE TIGHTENING 586567 SCREW



▲ INCLUDED IN
920230 SEAL KIT

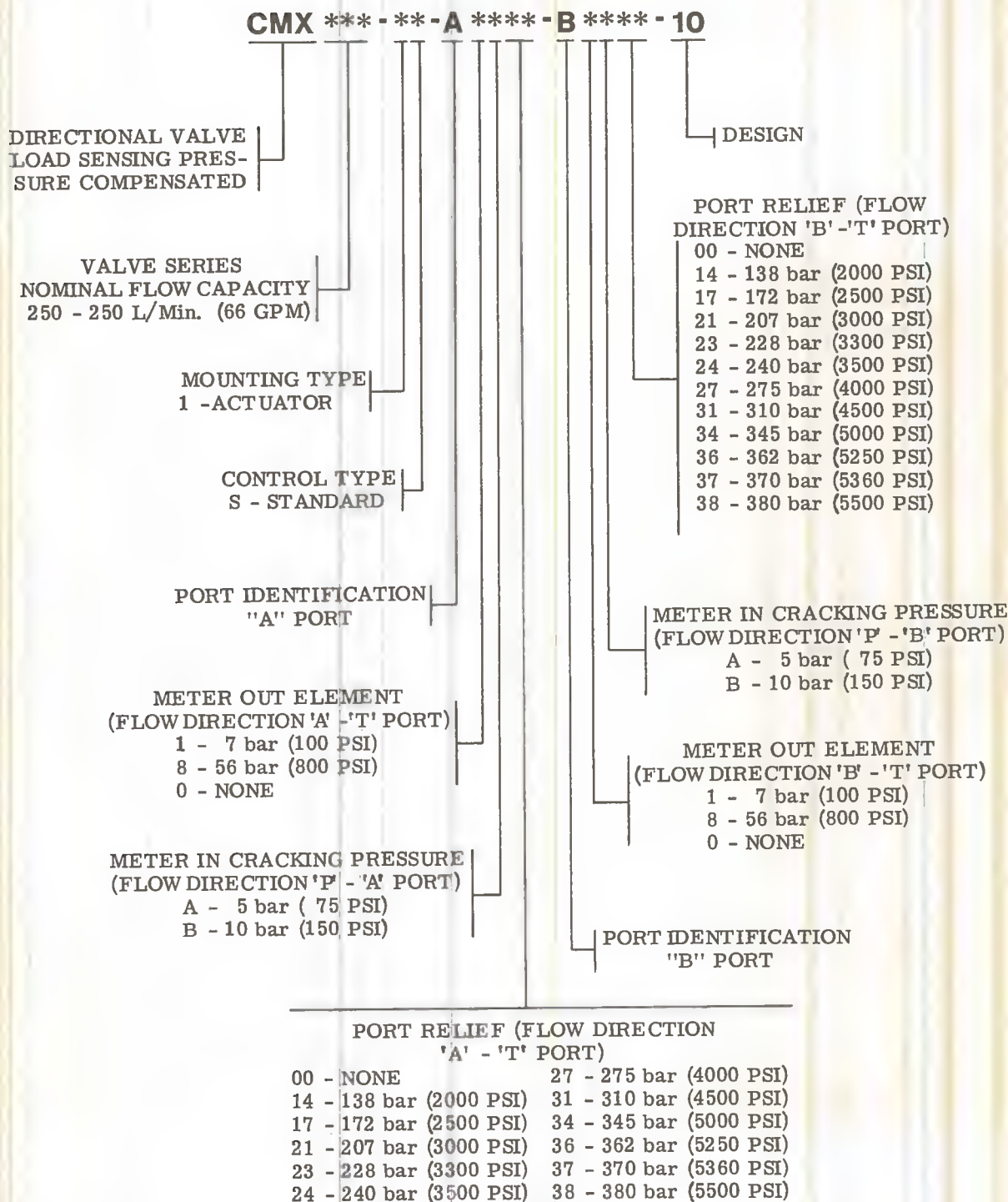
◆ NOT AVAILABLE
AS A SERVICE PART

METER IN SPRING		
SPRING	PORT	CRACKING PRESSURE
583421	A and/or B	5 bar (75 PSI)
573302	A and/or B	10 bar (150 PSI)

METER OUT POPPET A & B PORT	PRESSURE DROP @ 250 L/Min. (66 GPM) FLOW
573311	7 bar (100 PSI)
583388	55 bar (800 PSI)

SHIMS - CYLINDER RELIEF		
Thickness mm(inch)	SHIM	Δ P/shim(approx.)
0.13 (.005)	941385	6.9 bar (100 PSI)
0.25 (.010)		13.8 bar (200 PSI)
0.76 (.030)		41.4 bar (600 PSI)

MODEL CODE BREAKDOWN



For satisfactory service life of these components, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from Vickers OFP, OFR, and OFRS series are recommended.

VICKERS®
A TRIMMOVA COMPANY

Service Parts Information

**Power Match™
Directional
Valve With
Load Sensing
& Pressure
Compensation**

CMX160-*S-A****-B****-10



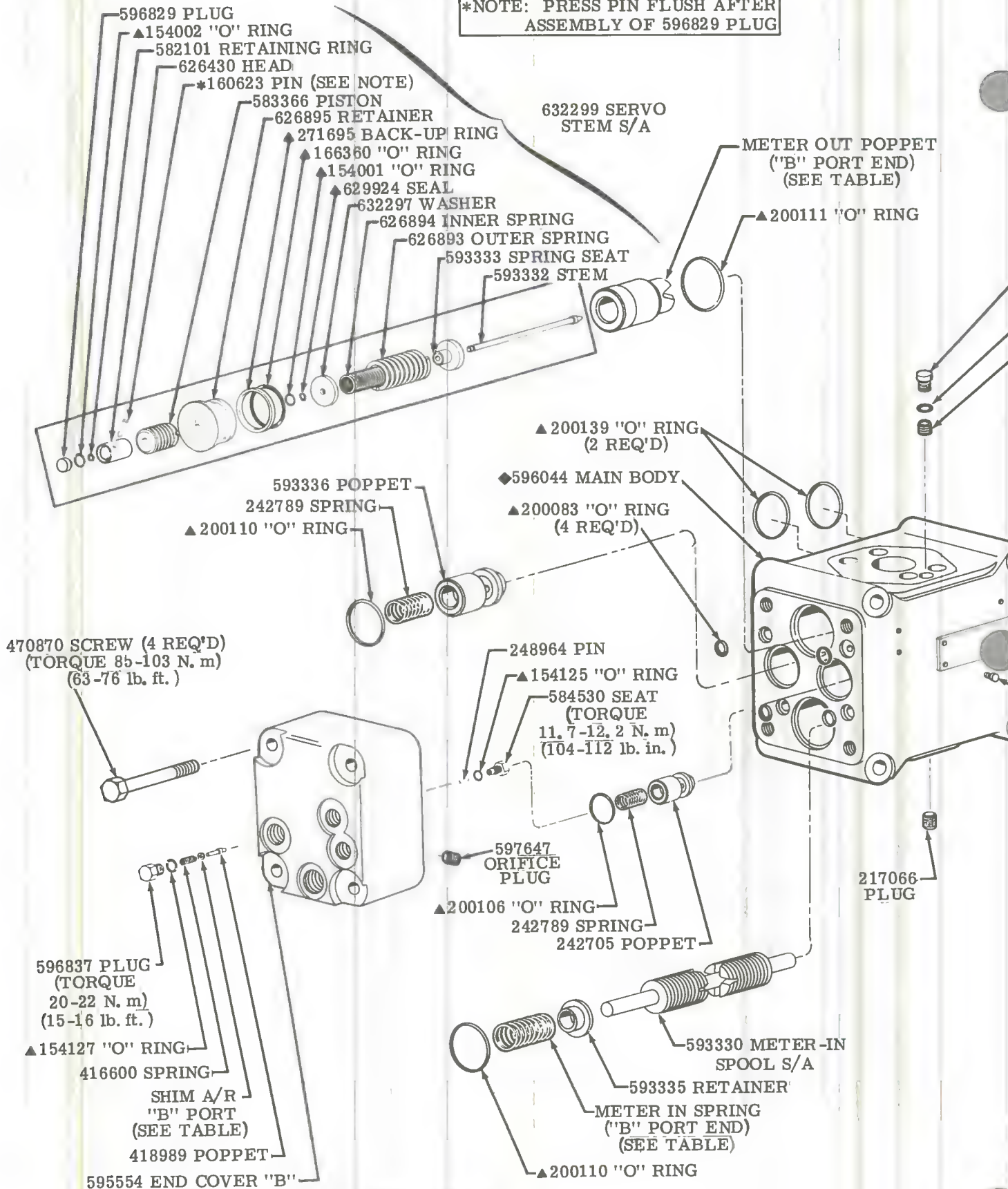
Vickers, Incorporated

P.O. Box 302
Troy, Michigan 48007-0302

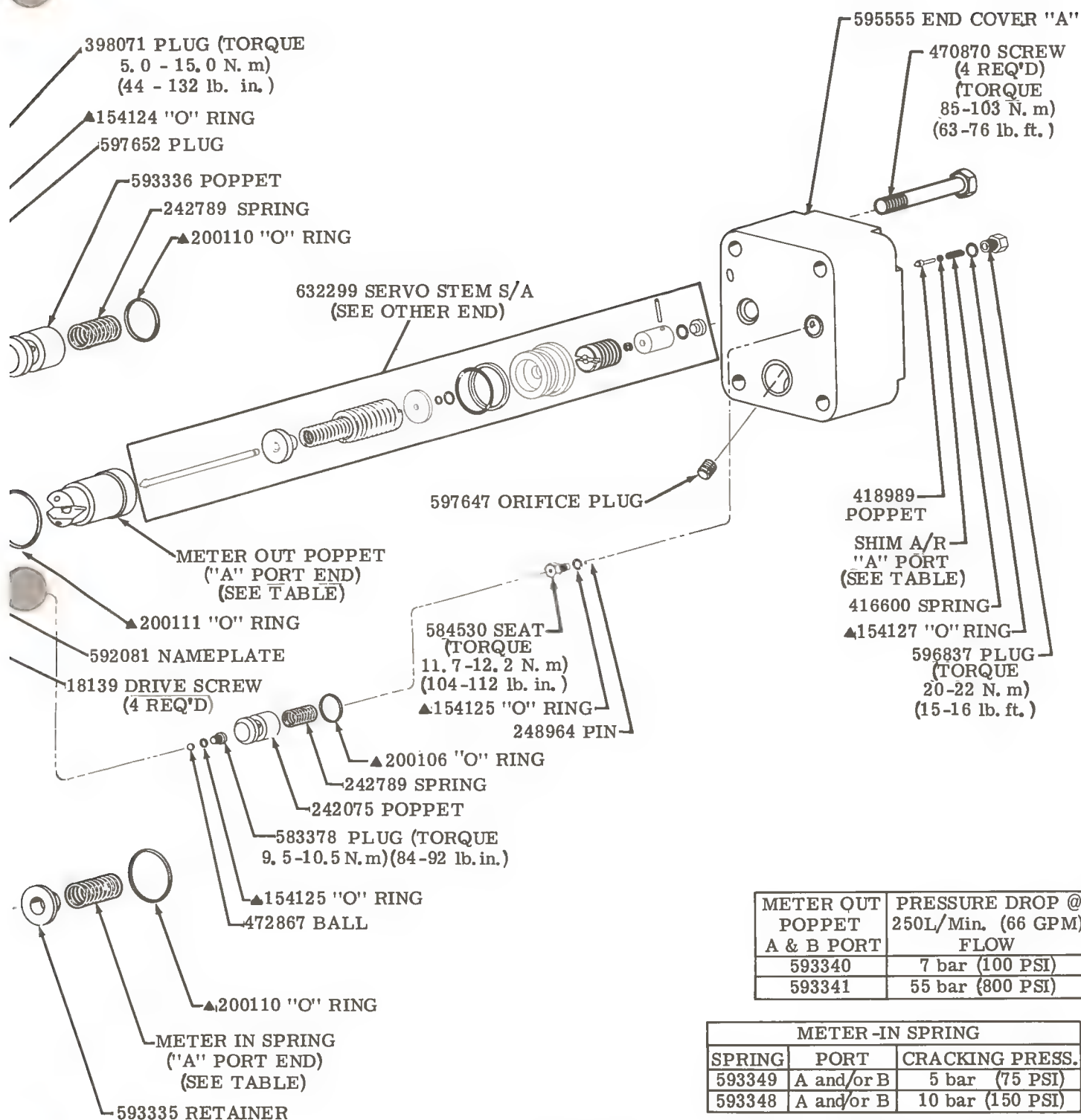
Revised 11-1-85

M-2407-S

***NOTE: PRESS PIN FLUSH AFTER
ASSEMBLY OF 596829 PLUG**



CAUTION
USE GUIDE PINS PER OVERHAUL
MANUAL M-2409-S TO ALIGN END
COVERS WITH MAIN BODY BE-
FORE TIGHTENING 470870 SCREW.



METER OUT POPPET A & B PORT	PRESSURE DROP @ 250L/Min. (66 GPM) FLOW
593340	7 bar (100 PSI)
593341	55 bar (800 PSI)

METER-IN SPRING		
SPRING	PORT	CRACKING PRESS.
593349	A and/or B	5 bar (75 PSI)
593348	A and/or B	10 bar (150 PSI)

SHIMS - CYLINDER RELIEF			
THICKNESS		SHIM KIT	ΔP/SHIM (approx.)
mm	inch		
0.05	.002	926284	3.8 bar (55 PSI)
0.25	.010		19.0 bar (275 PSI)
0.45	.018		34.2 bar (496 PSI)
0.70	.028		53.2 bar (771 PSI)

▲ INCLUDED IN
SEAL KIT 920273

◆ NOT AVAILABLE
AS A SERVICE PART

MODEL CODE BREAKDOWN

CMX*-**-A****-B****-10-*****

DIRECTIONAL VALVE
LOAD SENSING PRES-
SURE COMPENSATED

VALVE SERIES
NOMINAL FLOW CAPACITY
160 - 160 L/Min. (42 GPM)

MOUNTING TYPE
1 - ACTUATOR

CONTROL TYPE
S - STANDARD

PORT IDENTIFICATION
"A" PORT

METER OUT ELEMENT
(FLOW DIRECTION 'A'-'T' PORT)
1 - 7 bar (100 PSI)
8 - 56 bar (800 PSI)
0 - NONE

METER IN CRACKING PRESSURE
(FLOW DIRECTION 'P'-'A' PORT)
A - 5 bar (75 PSI)
B - 10 bar (150 PSI)

PORT RELIEF (FLOW
DIRECTION 'A' - 'T' PORT)
00 - NONE
14 - 140 bar (2030 PSI)
15 - 150 bar (2175 PSI)
16 - 160 bar (2320 PSI)
17 - 170 bar (2465 PSI)
18 - 180 bar (2610 PSI)
19 - 190 bar (2755 PSI)
20 - 200 bar (2900 PSI)
21 - 210 bar (3045 PSI)
23 - 230 bar (3335 PSI)
24 - 240 bar (3480 PSI)
27 - 270 bar (3915 PSI)
31 - 310 bar (4495 PSI)
34 - 340 bar (4930 PSI)
36 - 360 bar (5220 PSI)
37 - 370 bar (5365 PSI)
38 - 380 bar (5510 PSI)
39 - 390 bar (5655 PSI)
40 - 400 bar (5800 PSI)
41 - 410 bar (5945 PSI)

14 THRU 41 CONSEC-
UTIVE NUMBERS 140
bar THRU 410 bar IN
INCREMENTS OF 10
bar ie. 2030 PSI THRU
5945 PSI IN INCRE-
MENTS OF 145 PSI.

SPECIAL
MODIFICATION
SUFFIX

DESIGN

PORT RELIEF (FLOW
DIRECTION 'B' - 'T' PORT)

00 - NONE
14 - 140 bar (2030 PSI)
15 - 150 bar (2175 PSI)
16 - 160 bar (2320 PSI)
17 - 170 bar (2465 PSI)
18 - 180 bar (2610 PSI)
19 - 190 bar (2755 PSI)
20 - 200 bar (2900 PSI)
21 - 210 bar (3045 PSI)
23 - 230 bar (3335 PSI)
24 - 240 bar (3480 PSI)
27 - 270 bar (3915 PSI)
31 - 310 bar (4495 PSI)
34 - 340 bar (4930 PSI)
36 - 360 bar (5220 PSI)
37 - 370 bar (5365 PSI)
38 - 380 bar (5510 PSI)
39 - 390 bar (5655 PSI)
40 - 400 bar (5800 PSI)
41 - 410 bar (5945 PSI)

14 THRU 41 CONSECUTIVE
NUMBERS 140 bar THRU 410
bar IN INCREMENTS OF 10 bar
ie. 2030 PSI THRU 5945 PSI
IN INCREMENTS OF 145 PSI.

METER IN CRACKING PRESSURE
(FLOW DIRECTION 'P'-'B' PORT)
A - 5 bar (75 PSI)
B - 10 bar (150 PSI)

METER OUT ELEMENT
(FLOW DIRECTION 'B' - 'T' PORT)
1 - 7 bar (100 PSI)
8 - 56 bar (800 PSI)
0 - NONE

PORT IDENTIFICATION
"B" PORT

For satisfactory service life of these components, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from Vickers OFP, OFR, and OFRS series are recommended.

Litho in U. S. A.

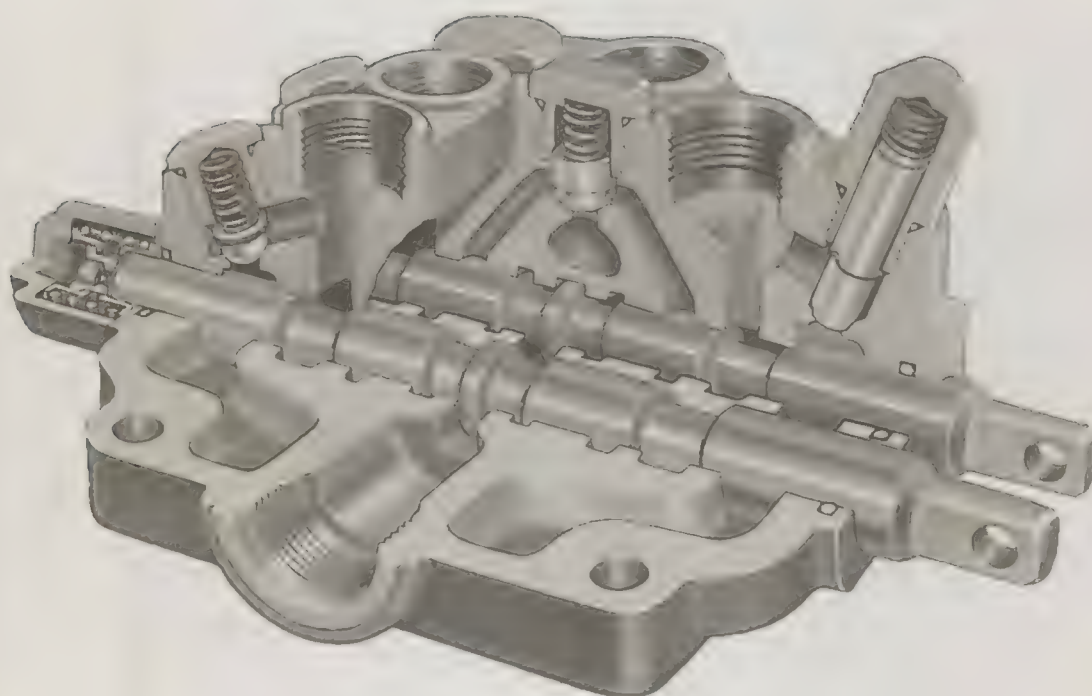
(4) 9-



Service Parts Information

**Directional
Valves**

CMD40 Series – 10 Design



Vickers, Incorporated

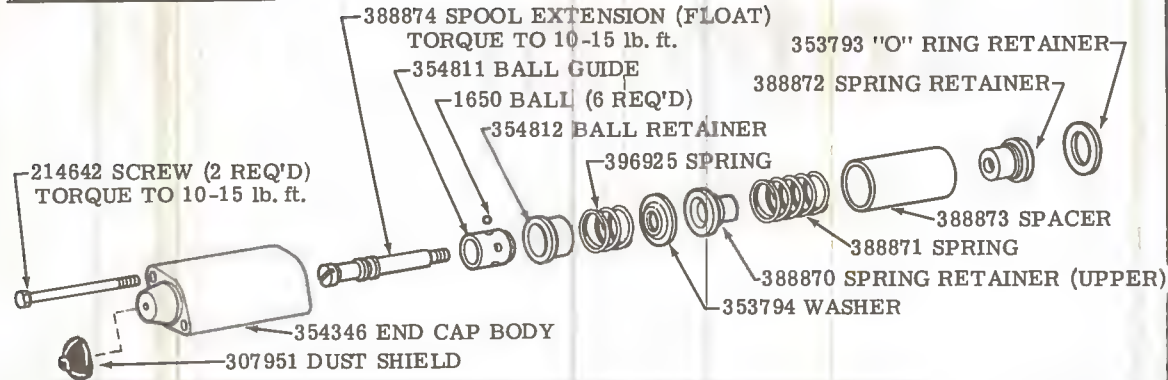
1401 Crooks Road
Troy, Michigan 48084

Revised 10-1-86

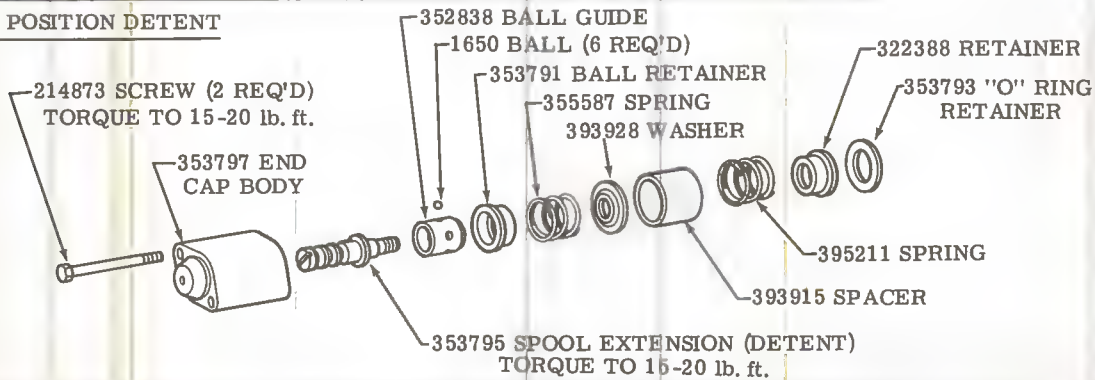
M-2421-S

FLOAT SPOOL DETENT

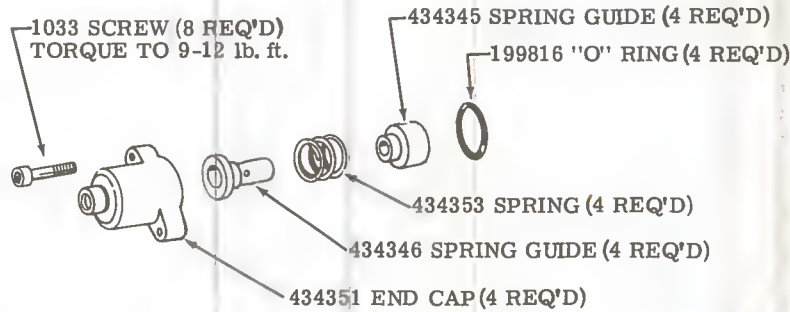
OPTIONS



3 POSITION DETENT



HYDRAULIC END CAP 3 POSITION



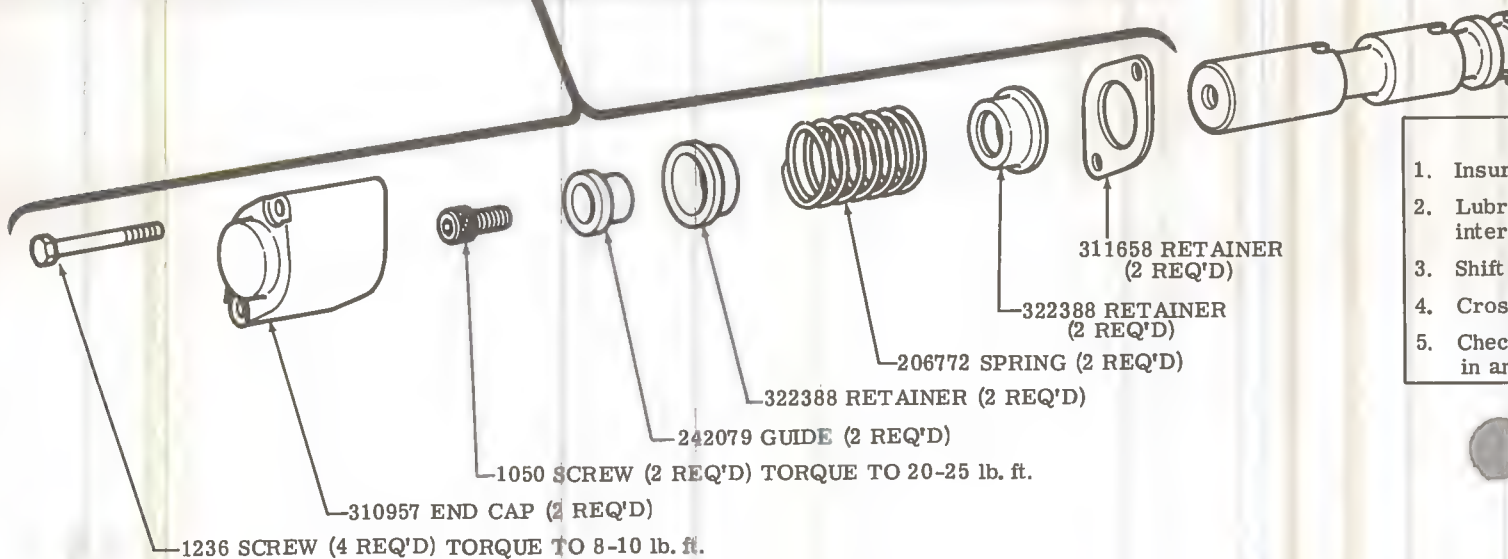
NOTE: SPOOL CHANGES WITH HYDRAULIC END CAPS

MODEL DESIGNATION

CMD40**-*07*-
CMD40**-*10*-
CMD40**-*12*-
CMD40**-*15*-
CMD40**-*17*-
CMD40**-*20*-
CMD40**-*22*-
CMD40**-*25*-
CMD40**-*27*-
CMD40**-*30*-

SEE ASSEMBLY PROCEDURE

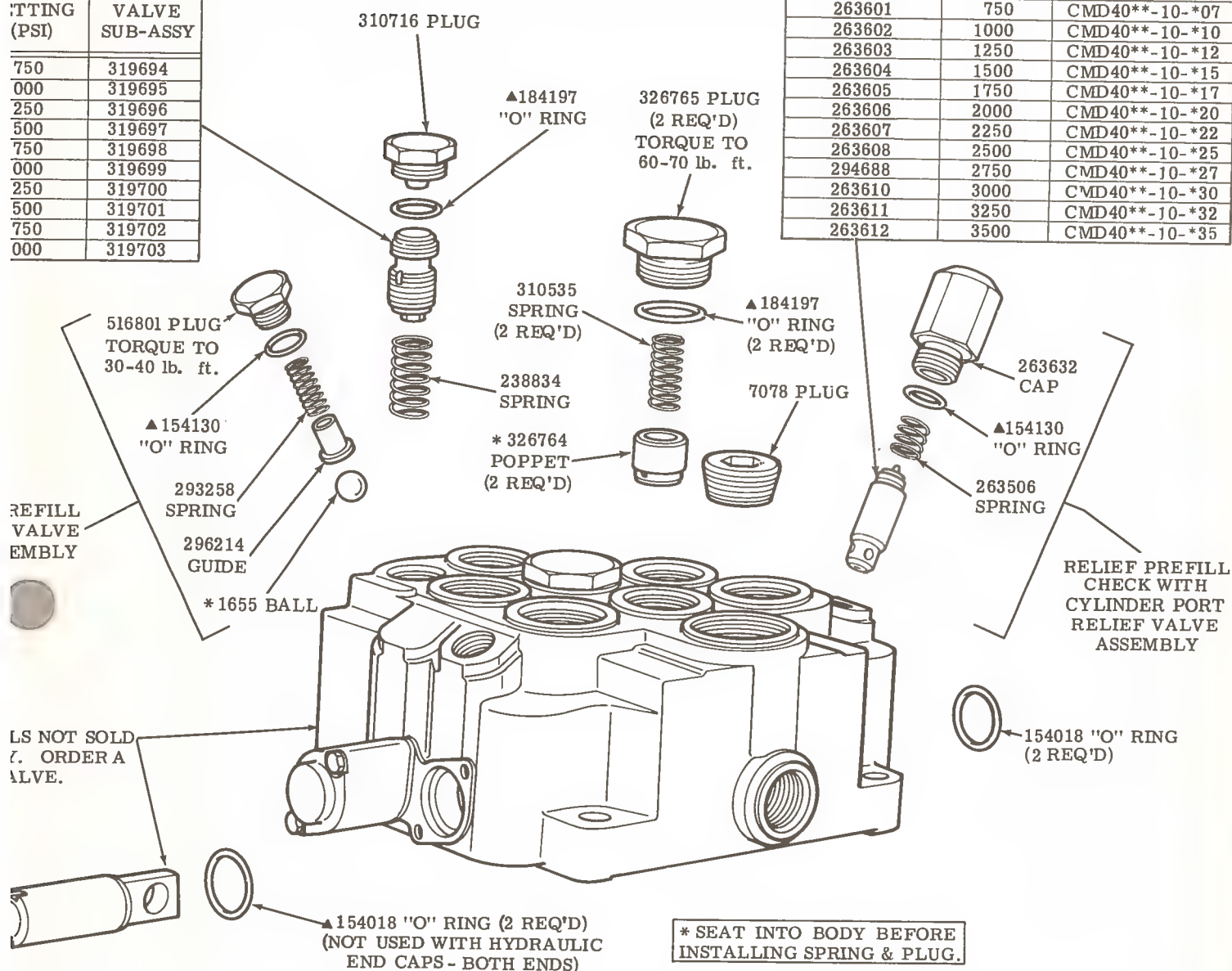
BODY
SEPA



1. Insur
2. Lubr
inter
3. Shift
4. Cros
5. Chec
in ar

RELIEF VALVE SETTING (PSI)	RELIEF VALVE SUB-ASSY
750	319694
1000	319695
1250	319696
1500	319697
1750	319698
2000	319699
2250	319700
2500	319701
2750	319702
3000	319703

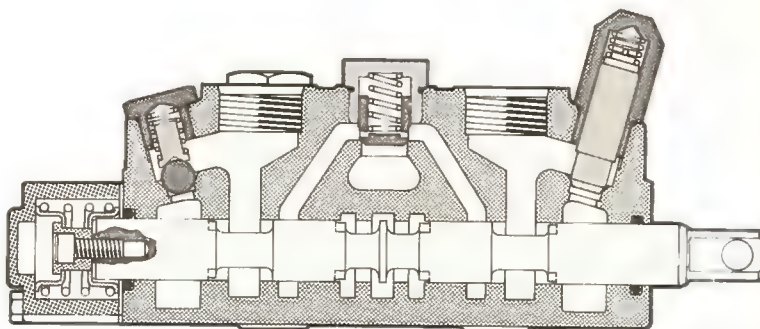
PORT RELIEF VALVE * KIT	RELIEF SETTING (PSI)	MODEL DESIGNATION
263601	750	CMD40**-10-*07
263602	1000	CMD40**-10-*10
263603	1250	CMD40**-10-*12
263604	1500	CMD40**-10-*15
263605	1750	CMD40**-10-*17
263606	2000	CMD40**-10-*20
263607	2250	CMD40**-10-*22
263608	2500	CMD40**-10-*25
294688	2750	CMD40**-10-*27
263610	3000	CMD40**-10-*30
263611	3250	CMD40**-10-*32
263612	3500	CMD40**-10-*35



AND 3 POSITION DETENT ASSEMBLY PROCEDURE

ool and detent extension are straight. Straighten if required. parts liberally with water proof grease. Assemble cap and . Leave mounting screw backed off approximately 2 turns. and out to align internal parts. mounting bolts to print requirements. re there is no bind by rotating spool 360° and shifting spool

▲ = SERVICED IN SEAL KIT 923419



MODEL CODE BREAKDOWN

CMD 40 - ** - ** - 10 - *****

MOBILE DIRECTIONAL VALVE

ASSEMBLY NUMBER

VALVE CAPACITY USGPM
(NOMINAL)
40-40

DESIGN NUMBER

INTEGRAL RELIEF
VALVE SETTINGS (PSI)

05-500	22-2250
07-750	25-2500
10-1000	27-2750
12-1250	30-3000
15-1500	32-3250
17-1750	35-3500
20-2000	

SPOOL SECTIONS

D- DOUBLE ACTING
R- REGENERATIVE-DOUBLE
ACTING-4 POSITION
T- SINGLE ACTING
W- REVERSE SINGLE ACTING

For satisfactory service life of these components in industrial applications, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from Vickers OFP, OFR, and OFRS series are recommended.

(3) 9-1

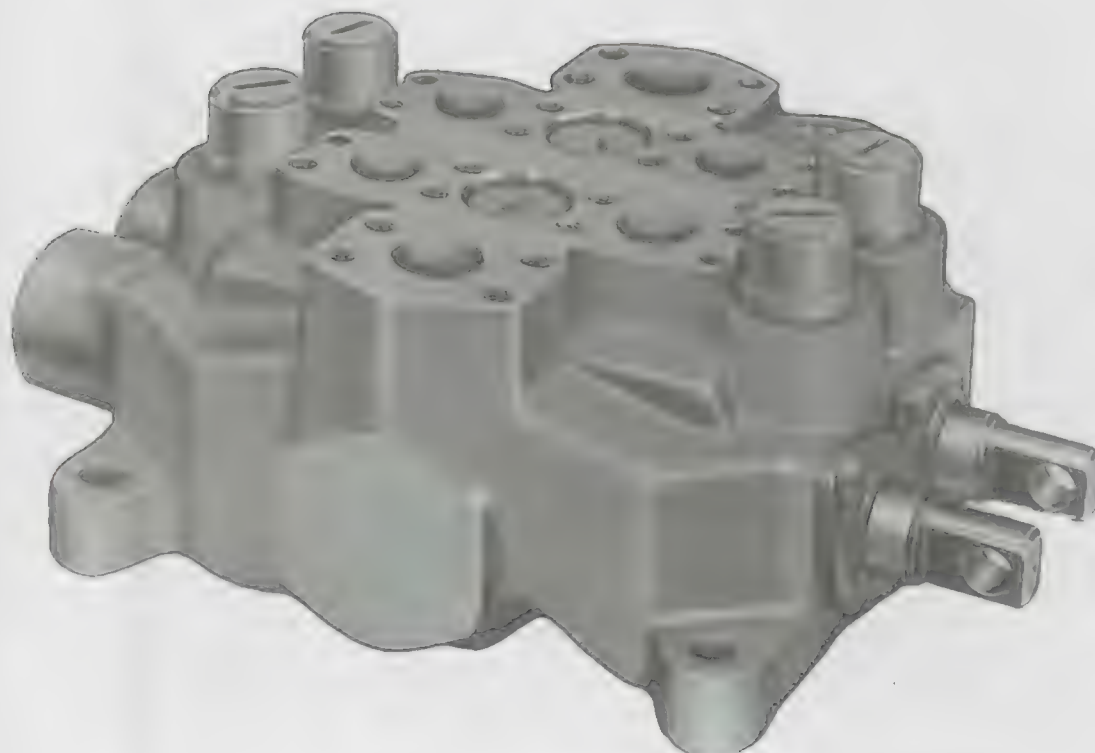


A TRIMMOVA COMPANY

Service Parts Information

**DIRECTIONAL
VALVES**

CMD60--***-10**



Vickers, Incorporated

1401 Crooks Road
Troy, Michigan 48084

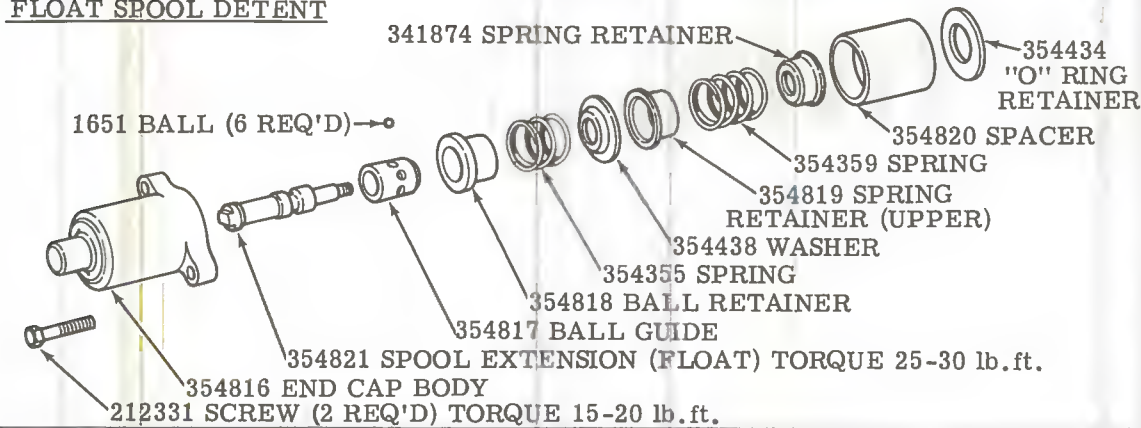
Revised 9-1-87

M-2422-S

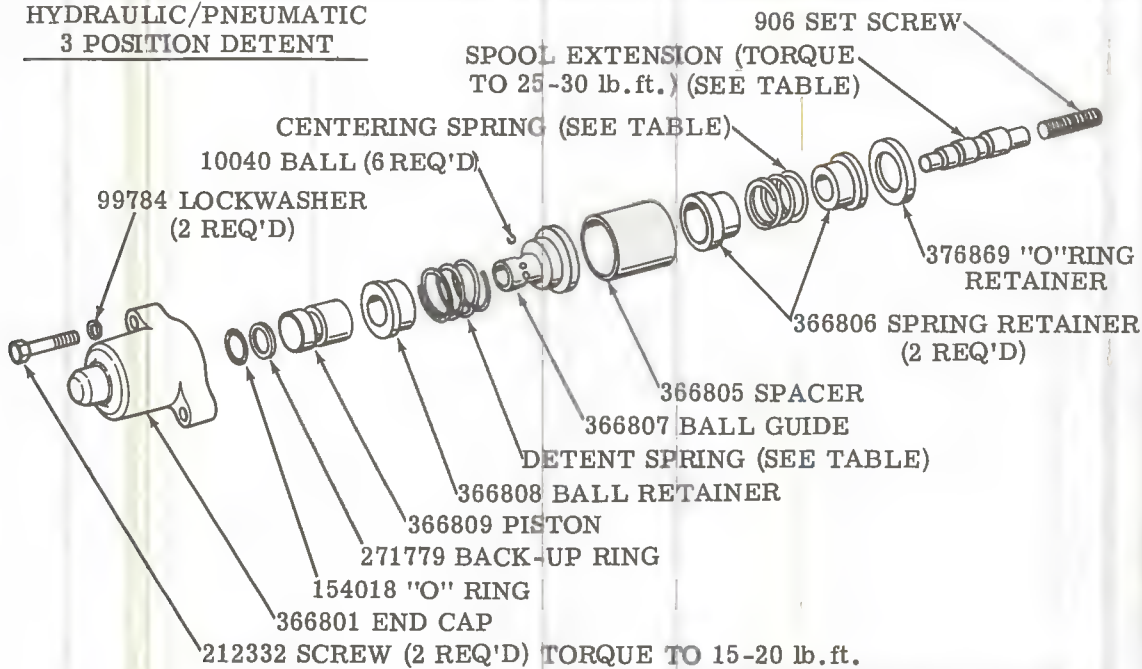
74

WARNING: USE THIS DRAWING FOR PARTS INFORMATION ONLY. SEE OVER

FLOAT SPOOL DETENT

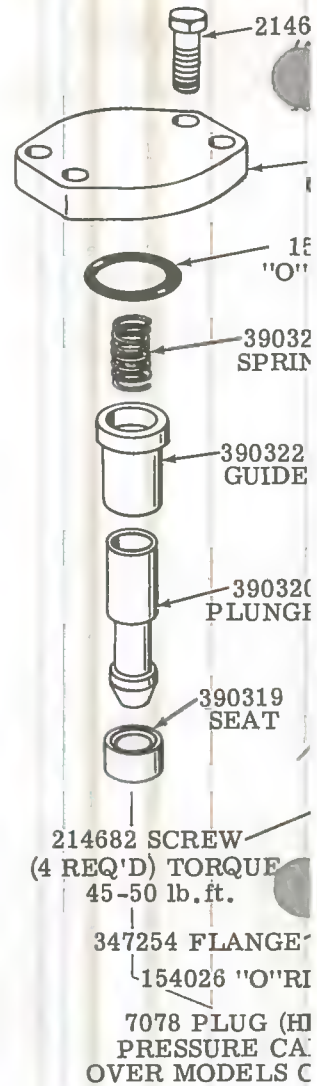


HYDRAULIC/PNEUMATIC
3 POSITION DETENT

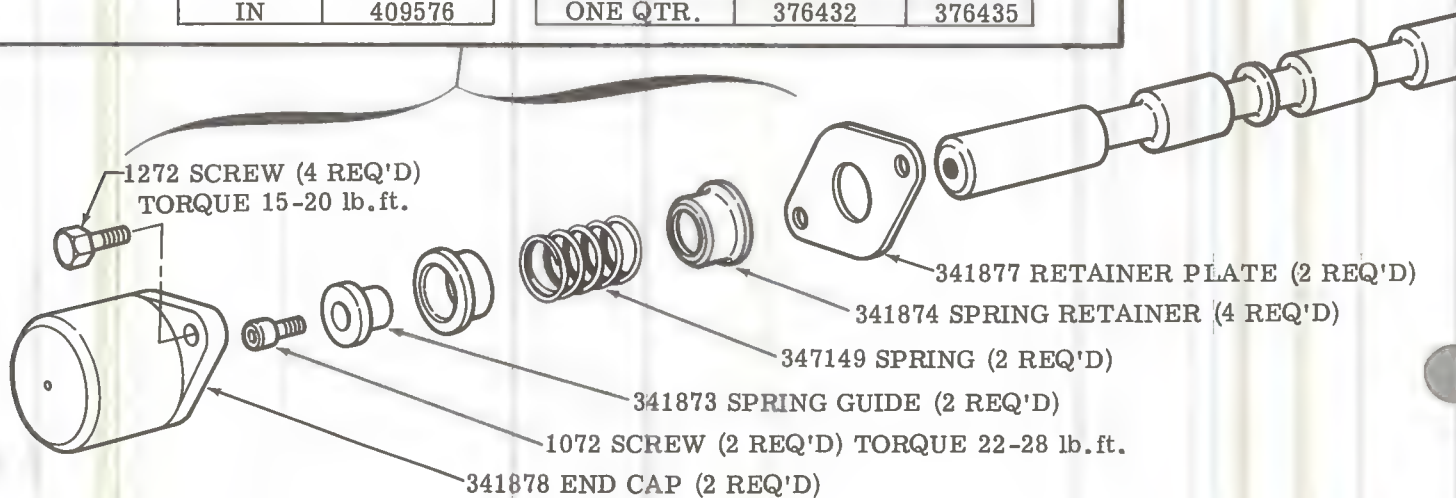


DETENT POSITION	SPOOL EXTENSION
IN & OUT	366804
OUT	393922
IN & OUT	407417
IN	409576

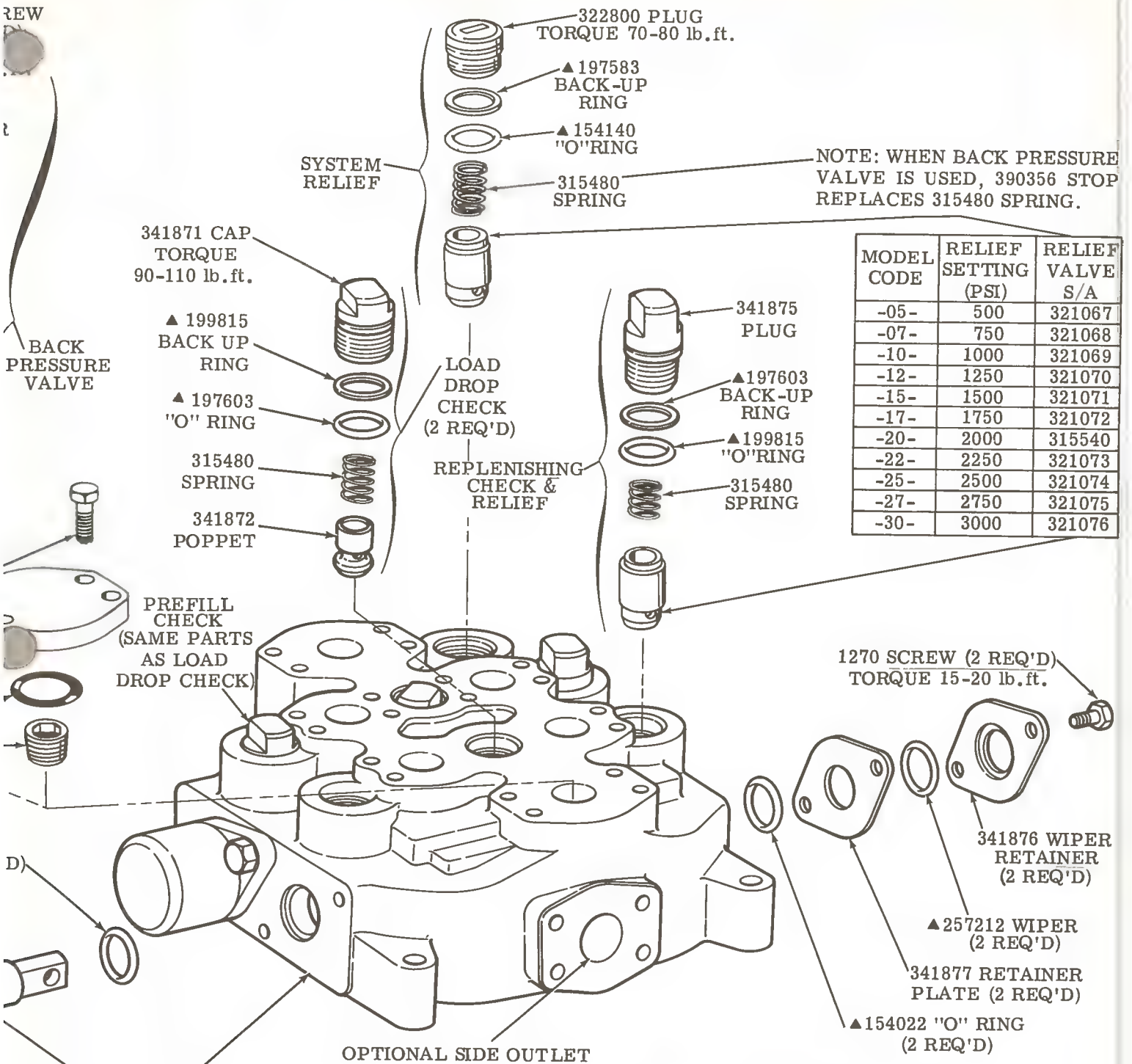
CENTERING SPRING RATE	CENTERING SPRING	DETENT SPRING
FULL	366760	366816
THREE QTR.	376430	376433
ONE HALF	376431	376434
ONE QTR.	376432	376435



▲ 154022 "O" RING (SEE TABLE)



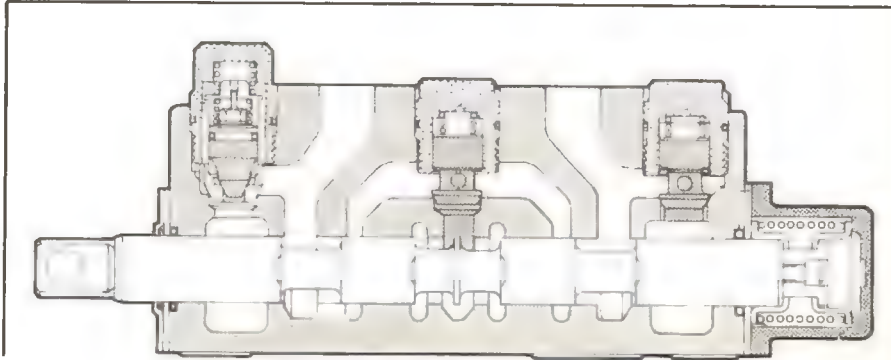
UL MANUAL M-2420-SFOR MAINTENANCE INFORMATION



MODEL CODE	RELIEF SETTING (PSI)	RELIEF VALVE S/A
-05-	500	321067
-07-	750	321068
-10-	1000	321069
-12-	1250	321070
-15-	1500	321071
-17-	1750	321072
-20-	2000	315540
-22-	2250	321073
-25-	2500	321074
-27-	2750	321075
-30-	3000	321076

BODY AND SPOOL NOT SOLD SEPARATELY. ORDER BY MODEL NUMBER

▲INCLUDED IN SEAL KIT 923420



MODEL CODE BREAKDOWN

CMD 60--***-10**

MOBILE
DIRECTIONAL
CONTROL

DESIGN

VALVE SERIES
NOMINAL CAPACITY
60 - 60 USGPM

SPOOL SECTIONS
B - DOUBLE ACTING MOTOR SPOOL
C - FLOAT SPOOL - 4 POSITION
D - DOUBLE ACTING
F - TRUCK SPOOL - 4 POSITION
G - REGENERATIVE FLOAT
T - SINGLE ACTING
S - SERIES - DOUBLE ACTING
W - REVERSE SINGLE ACTING

INTEGRAL RELIEF VALVE SETTING
(AVAILABLE IN INCREMENTS
OF 250 PSI FROM 750-3000 PSI)
07 - 750 PSI 20 - 2000 PSI
10 - 1000 PSI 22 - 2250 PSI
12 - 1250 PSI 25 - 2500 PSI
15 - 1500 PSI 27 - 2750 PSI
17 - 1750 PSI 30 - 3000 PSI

NOTE

CMD VALVES OFFER SO MANY OPTIONS THAT ALL VARIATIONS CANNOT BE SHOWN IN THE ABOVE MODEL CODE. THE MODEL CODE DEPICTS ONLY OPTIONS COMMON TO THE VALVE SERIES

For satisfactory service life of these components, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from Vickers OFP, OFR and OFRS filter series are recommended.

Litho in U.S.A.

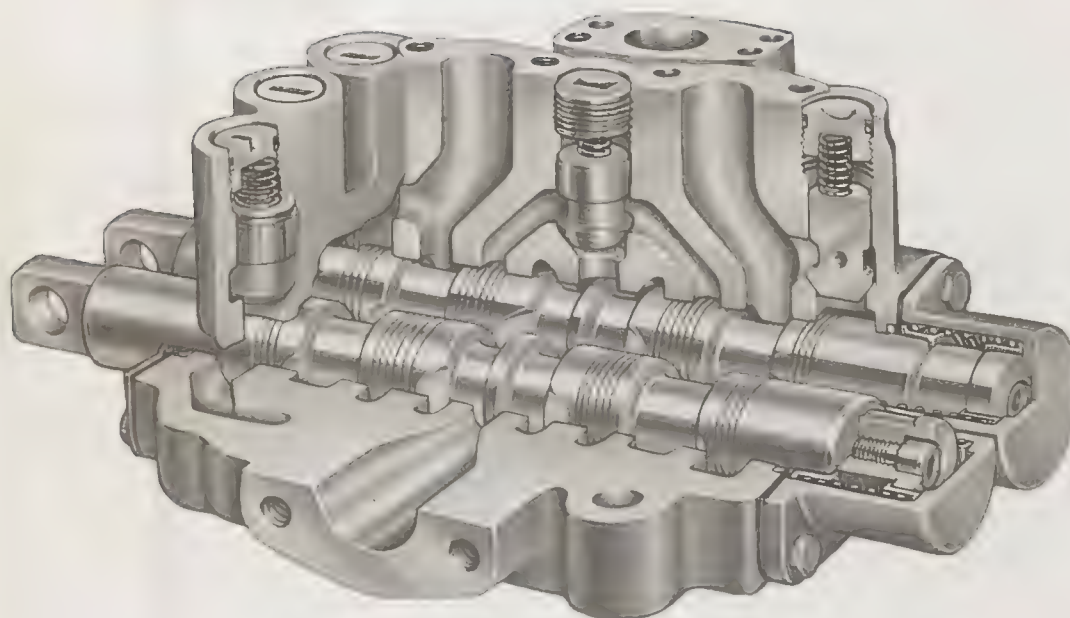


A TRINHOVA COMPANY

Service Parts Information

Directional
Valves

CMD90 Series -10 Design



Vickers, Incorporated

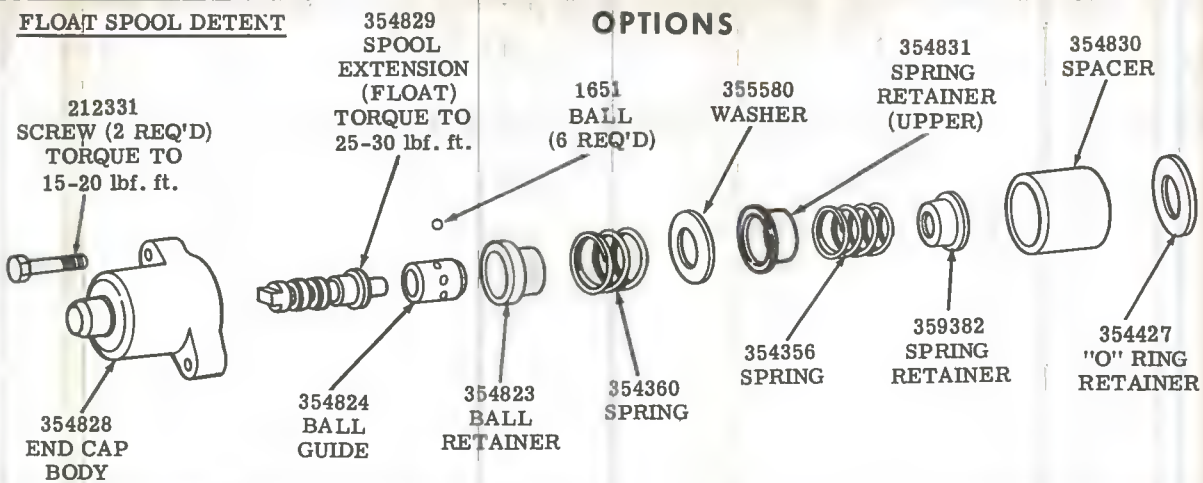
1401 Crooks Road
Troy, Michigan 48084

Revised 11-1-85

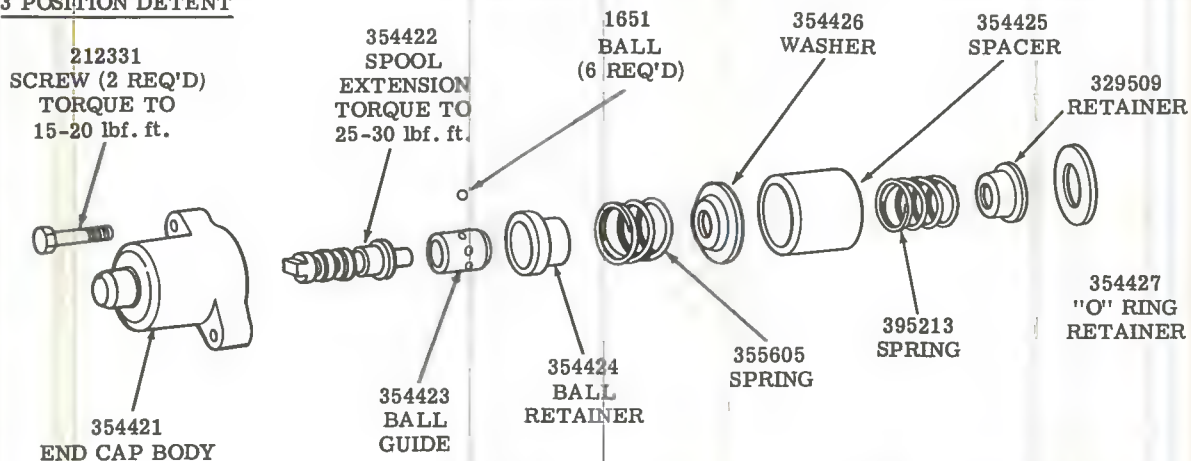
M-2423-S

75

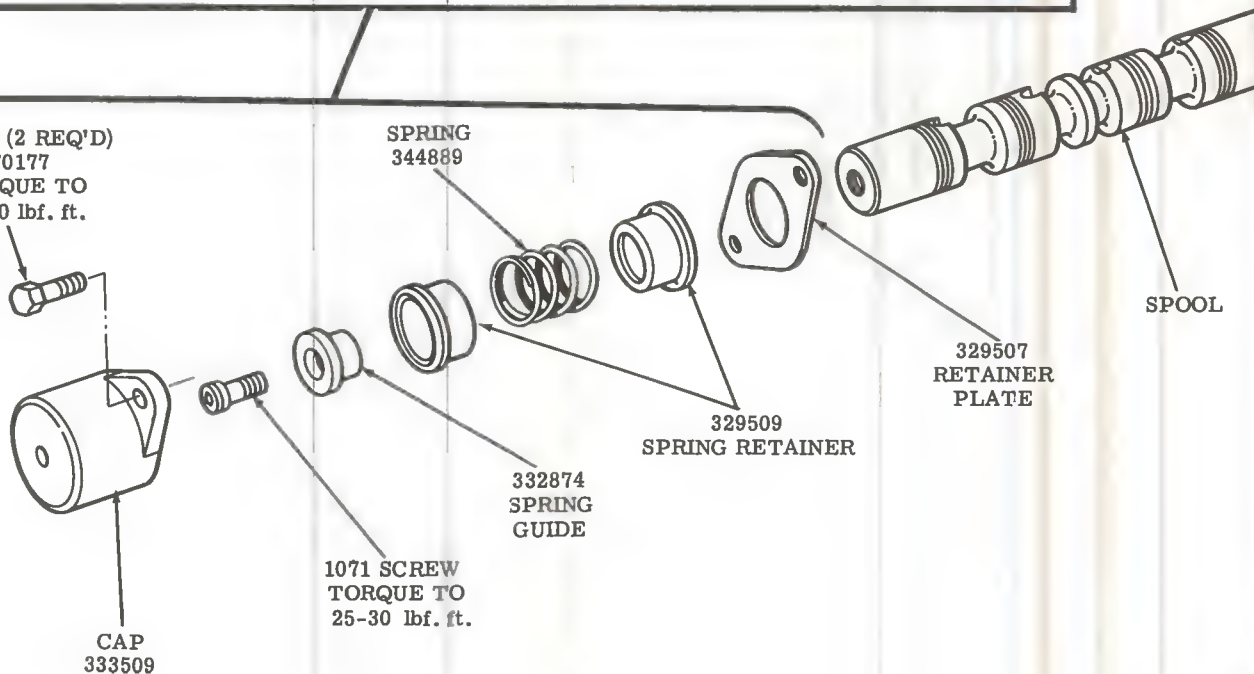
FLOAT SPOOL DETENT



3 POSITION DETENT



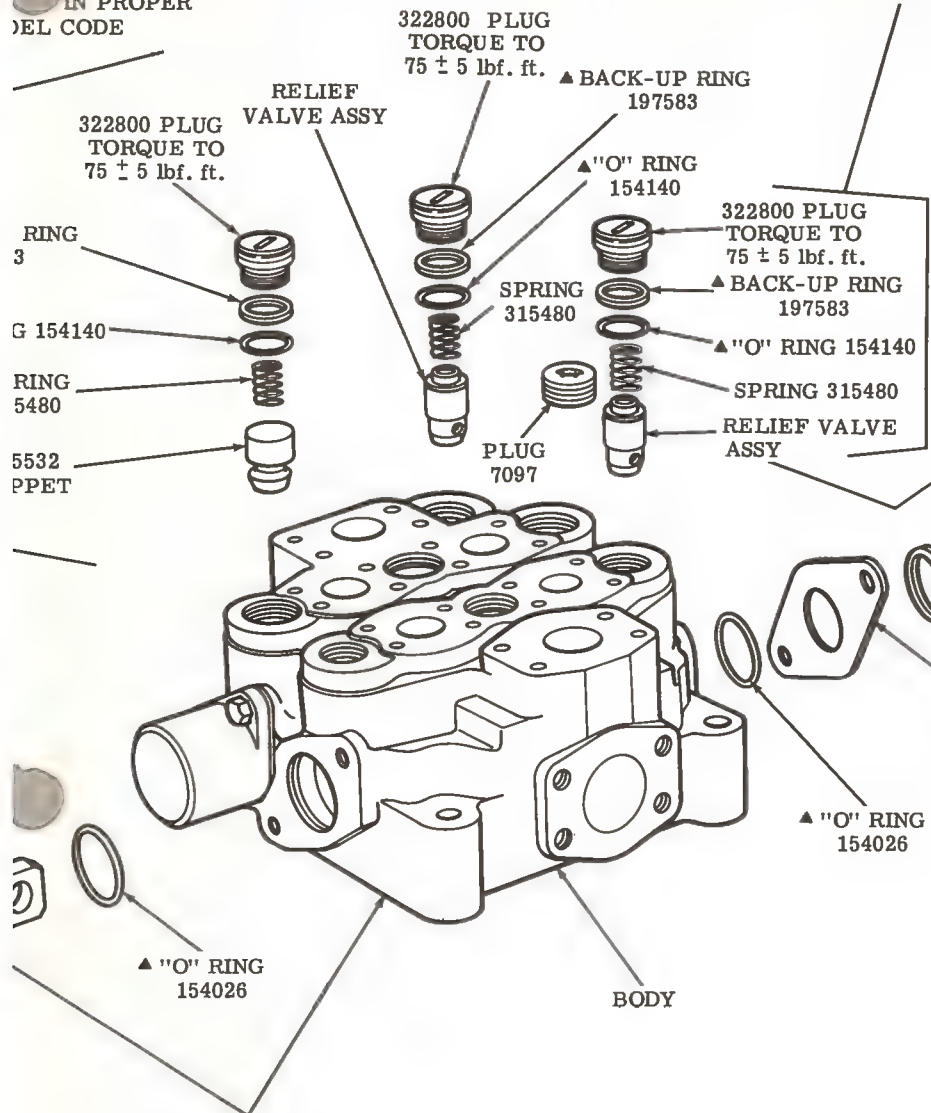
SCREW (2 REQ'D)
170177
TORQUE TO
25-30 lbf. ft.



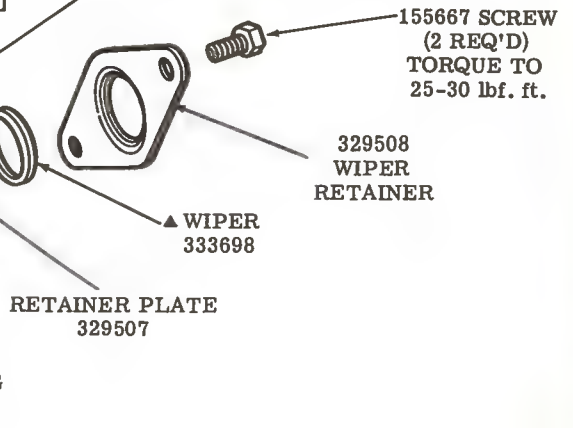
INCLUDE COMPLETE MODEL NUMBER ON ALL PARTS ORDERS

VALVE ASSY.
IN PROPER
MODEL CODE

RELIEF & REPLENISHING
VALVE ASSEMBLY.
INSTALL AS REQ'D IN PROPER
PORT PER MODEL CODE

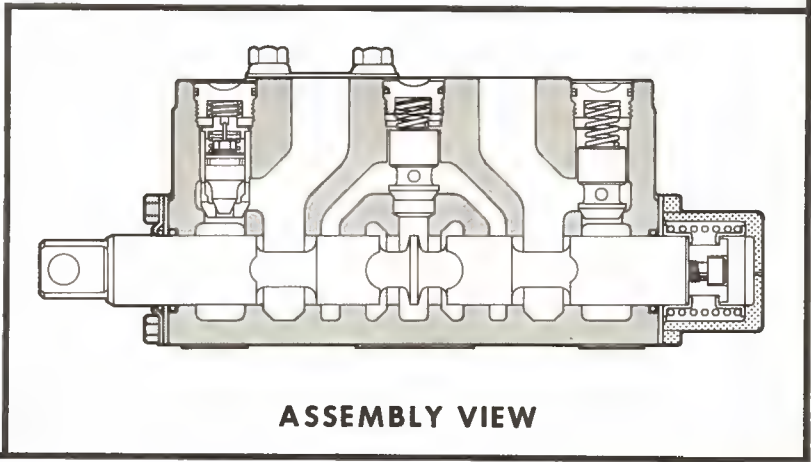


MODEL DESIGNATION	RELIEF SETTING (PSI)	RELIEF VALVE SUB-ASSY
CMD90-**-051**-10	500	321067
CMD90-**-07**-10	750	321068
CMD90-**-10**-10	1000	321069
CMD90-**-12**-10	1250	321070
CMD90-**-15**-10	1500	321071
CMD90-**-17**-10	1750	321072
CMD90-**-20**-10	2000	315540
CMD90-**-22**-10	2250	321073
CMD90-**-25**-10	2500	321074
CMD90-**-27**-10	2750	321075
CMD90-**-30**-10	3000	321076



BODY & SPOOL
NOT SOLD SEPARATELY
ORDER COMPLETE UNIT

▲ SERVICED IN SEAL KIT 923421



MODEL CODE BREAKDOWN

CMD 90 - 30 - DDD - 10 - * * * * *

MOBILE DIRECTIONAL CONTROL

ASSEMBLY NUMBER

VALVE SERIES

(NOMINAL CAPACITY-US GPM)

90-90

DESIGN NUMBERS

INTEGRAL RELIEF VALVE SETTINGS

(AVAILABLE IN INCREMENTS OF 250 PSI

FROM 750 - 3000 PSI

07-750 PSI	20-2000 PSI
10-1000 PSI	22-2250 PSI
12-1250 PSI	25-2500 PSI
15-1500 PSI	27-2750 PSI
17-1750 PSI	30-3000 PSI

SPOOL SECTIONS

D- DOUBLE ACTING

T- SINGLE ACTING

W-REVERSE SINGLE ACTING

B- DOUBLE ACTING MOTOR SPOOL

C- FLOAT SPOOL - 4 POSITION

S- SERIES, DOUBLE ACTING

F- TRUCK SPOOL - 4 POSITION

G- REGENERATIVE FLOAT

R- REGENERATIVE, DOUBLE

ACTING 4 POSITION

For satisfactory service life of these components, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from Vickers OFP, OFR, and OFRS series are recommended.

Litho in U.S.A.

Service Parts Information

**Pressure
Centered
Pilot Operated
Directional
Control Valves**

DG3S-8-*D-*-*-10



Vickers, Incorporated

1401 Crooks Road
Troy, Michigan 48084

Revised 11-1-85

I-3436-S

▲ 262402 "O" RING

▲ 262330 "O" RING

135369
ADJ. SCREW

1489 NUT

223075 PISTON

289339 COVER

470843 SCREW (4 REQ'D)
TORQUE TO 49-59 N. m
(36-43.5 lb. ft.)
(METRIC THREAD)

PARTS SHOWN INCLUDED IN
STROKE ADJUSTMENT KIT
941154. STROKE ADJUST-
MENT CYLINDER "B" END
ONLY.

COVER ATTACHING BOLTS	
MODEL	BOLT KIT
W/OUT PILOT CHOKE	466834
W/PILOT CHOKE	466836
TORQUE TO 4.5 - 5.7 N. m (39.8 - 50.4 lb. in.)	
BOLT KITS INCLUDE 4 SCREWS	

PILOT
(SEE B
FOR

■ PLUG TORQUES		
PLUG	TORQUE (N. m.)	TORQUE (lb. in.)
343740	10.0 - 11.8	90 - 105
398071	3.4 - 4.0	30 - 35
407533	3.4 - 4.0	30 - 35

MODEL	SPOOL	I. D. PLATE WITH CIRCUIT DIAGRAM
DG3S-8-0D*-*-10	363495	400967
DG3S-8-1D*-*-10	*276623	400968
DG3S-8-2D*-*-10	363496	400969
DG3S-8-3D*-*-10	*276625	400970
DG3S-8-4D*-*-10	276626	400971
DG3S-8-6D*-*-10	363498	400972
DG3S-8-8D*-*-10	363499	400971
DG3S-8-9D*-*-10	363500	400967
DG3S-8-33D*-*-10	363501	400972

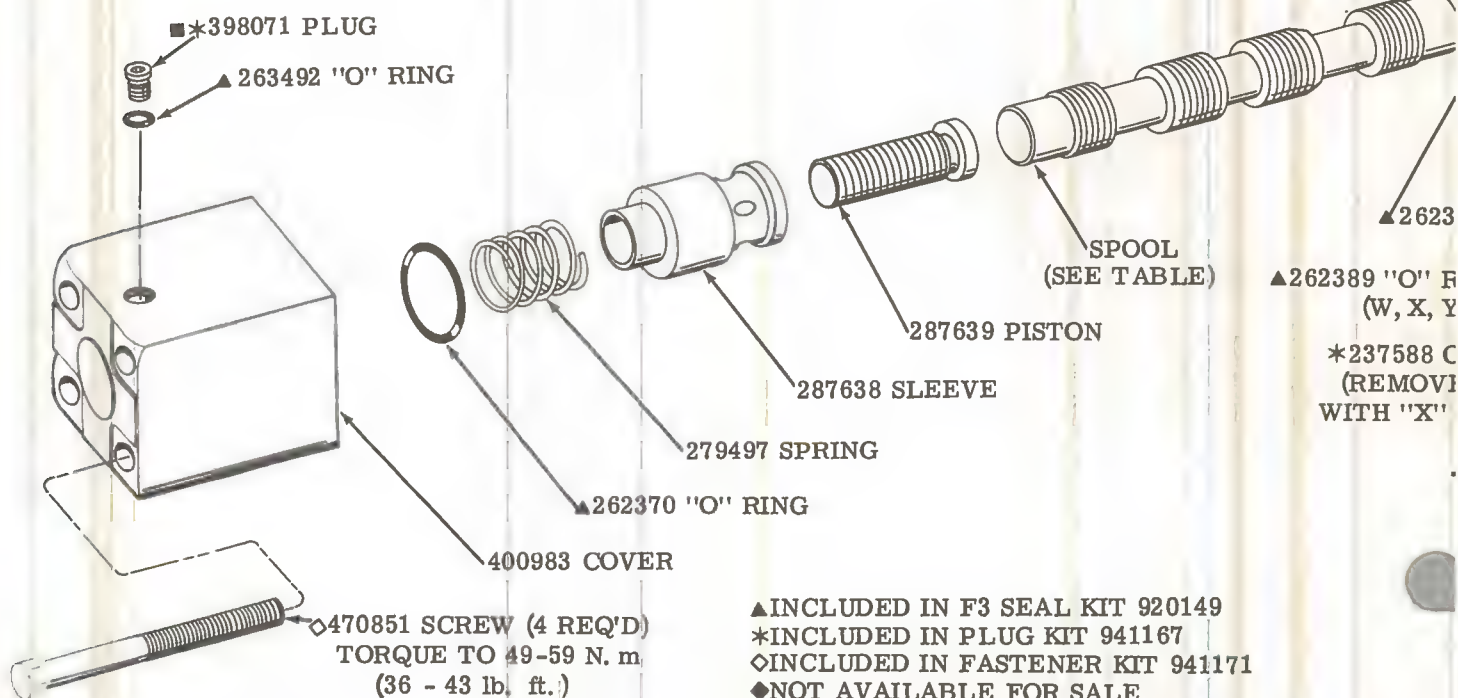
* NOTE
ASSEMBLE TYPE 1 AND 3 SPOOLS WITH NARROW
CENTER LAND TOWARD "A" END OF VALVE. "A"
END OF VALVE IS DEFINED AS BEING CLOSEST
TO CYLINDER PORT "A".

416834 RIVET (4 REQ'D)

IDENTIFICATION PLATE
(SEE TABLE)

▲ 263492 "O" RING

■ *398071 PLUG

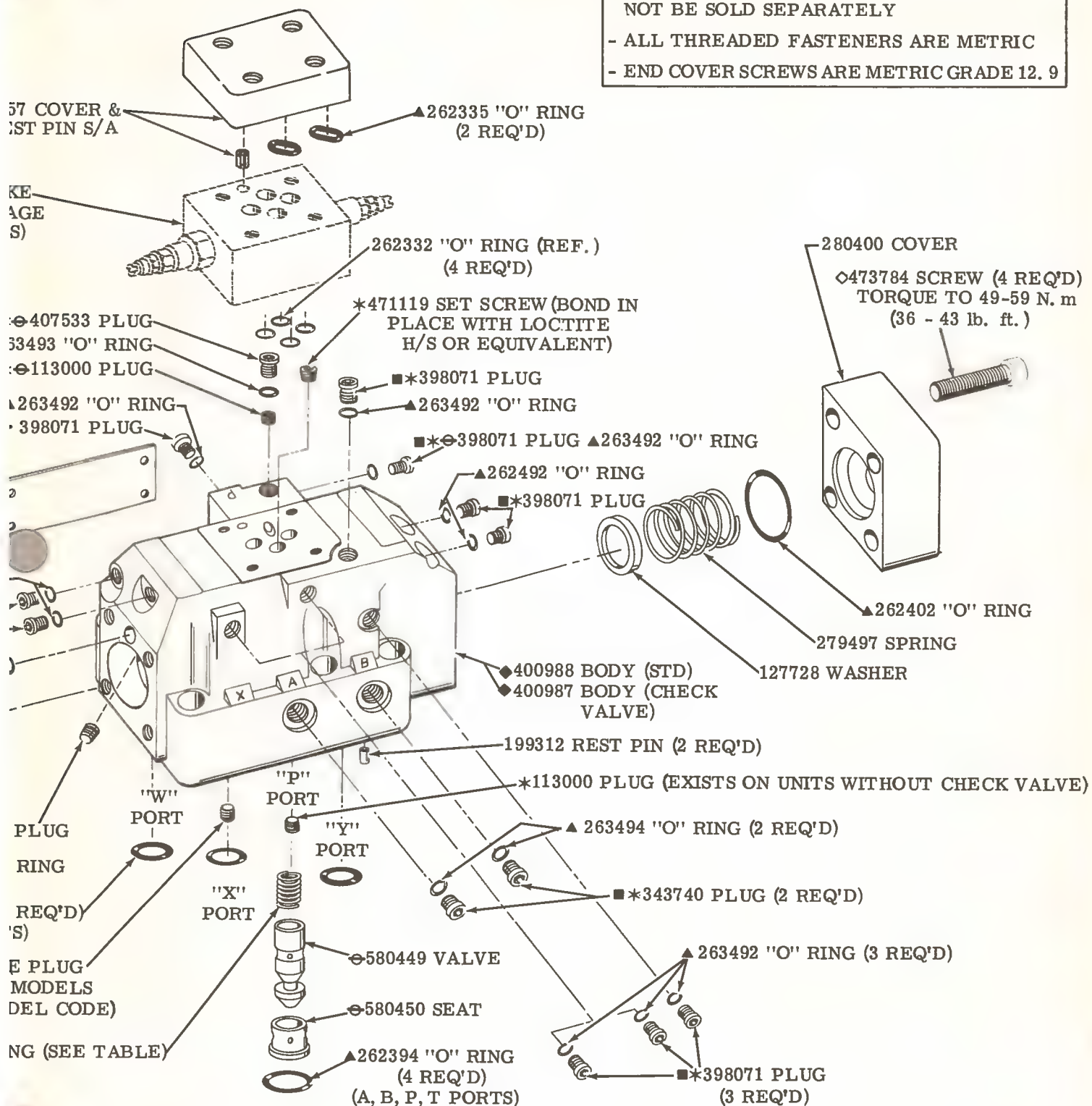


▲ INCLUDED IN F3 SEAL KIT 920149
* INCLUDED IN PLUG KIT 941167
◆ INCLUDED IN FASTENER KIT 941171
◆ NOT AVAILABLE FOR SALE
⊕ USED ON CHECK VALVE MODELS ONLY

COVER ATTACHING
BOLTS (SEE TABLE)

NOTE

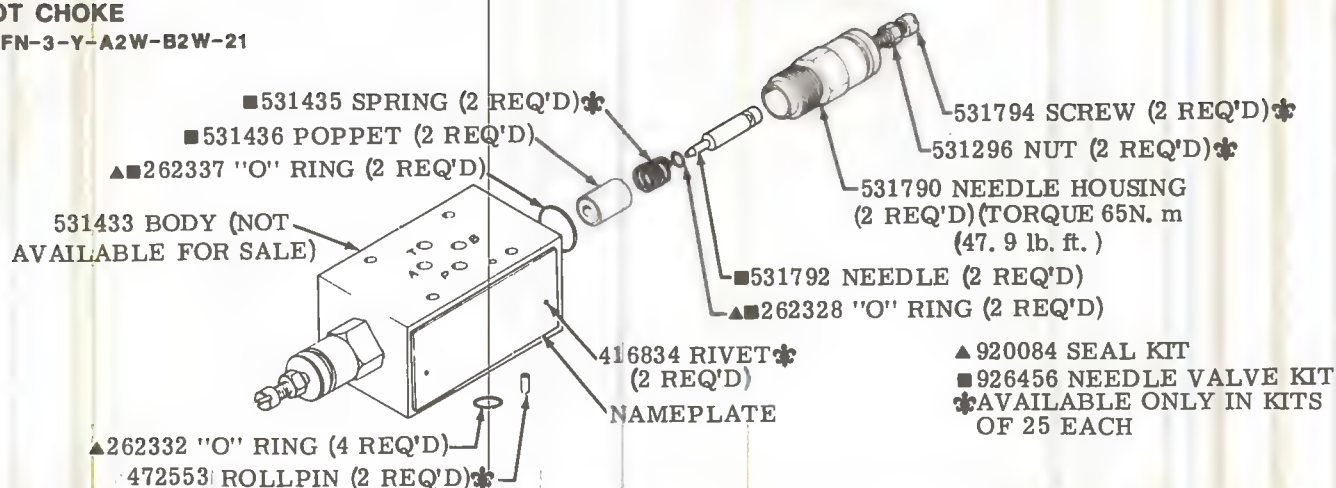
- PARTS INCLUDED IN SERVICE KITS WILL NOT BE SOLD SEPARATELY
- ALL THREADED FASTENERS ARE METRIC
- END COVER SCREWS ARE METRIC GRADE 12. 9



MODEL	SPRING	COLOR
DG3S-8-*D*-*K-10	398130	
DG3S-8-*D*-*R-10	398131	YELLOW
DG3S-8-*D*-*S-10	398132	RED

PILOT CHOKE

DGMFN-3-Y-A2W-B2W-21



MODEL CODE BREAKDOWN

(F3) - D G 3 S - 8 - * D * - * - * - 10

SPECIAL SEALS FOR MINERAL OIL OR FIRE RESISTANT FLUID

DIRECTIONAL CONTROL VALVE

SUBPLATE MOUNTING

PILOT OPERATED

RATED PRESSURE
210 bar
(3000 PSI)

INTERFACE C. E. T. O. P. 8

SPOOL TYPE

VALVE TYPE
D - PRESSURE
CENTERED

DESIGN

CHECK VALVE IN PRESSURE PORT
(OMIT WHEN NOT REQUIRED)

K - 0.35 bar (5 PSI)
R - 3.45 bar (50 PSI)
S - 5.2 bar (75 PSI)

SPOOL CONTROL MODIFICATION
(OMIT WHEN NOT REQUIRED)

2 - PILOT CHOKE
8 - STROKE ADJUSTMENT
CYLINDER "B" END ONLY
2-8 - IF BOTH ARE REQ'D

"X" - FAST RESPONSE MODEL
(OMIT FOR STANDARD MODELS)

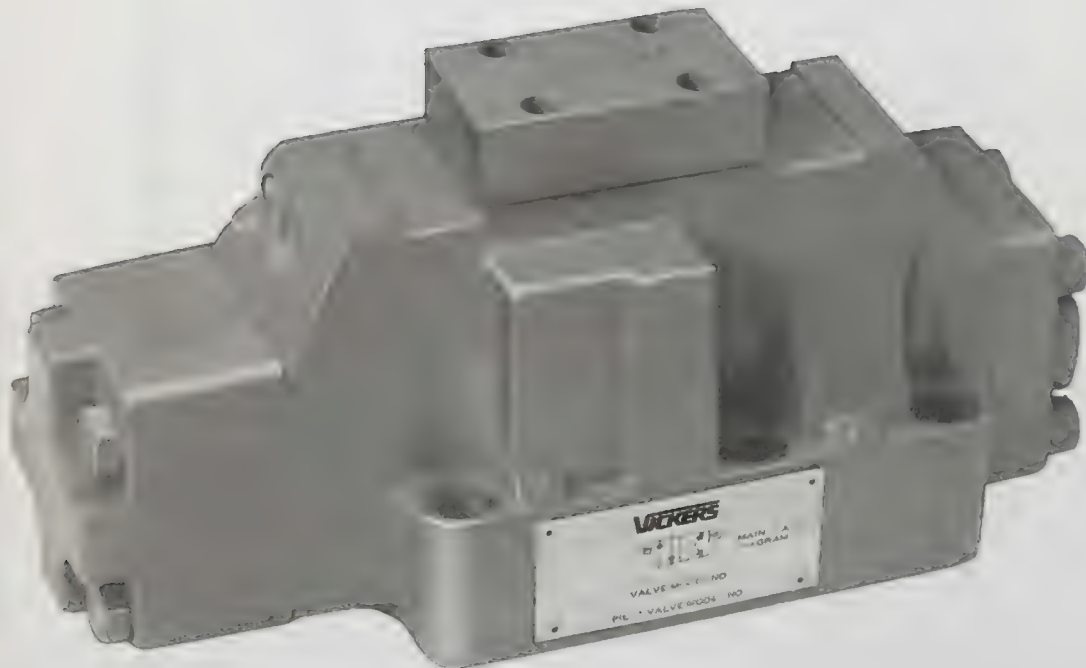
For satisfactory service life of these components in industrial applications, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from Vickers OFP, OFR, and OFRS series are recommended.

Litho in U. S. A.

Service Parts Information

Pilot
Operated
Directional
Control
Valves

DG3S-8-*A*-*-*-10



Vickers, Incorporated

P.O. Box 302
Troy, Michigan 48007-0302

Revised 11-1-85

I-3437-S

470843 SCREW (4 REQ'D)
TORQUE TO 49-59 N. m
(36 - 43.5 lb. ft.)

135369 ADJ.
SCREW

1489 NUT

289339 COVER

▲262330 "O" RING

223075 PISTON

▲262402 "O" RING

PARTS SHOWN INCLUDED IN
STROKE ADJUSTMENT KIT
941154. ONE KIT REQUIRED.

941157 COVER
& REST PIN
S/A

400982 COVER

472553 REST PIN

PILOT CHOKE
(SEE BACK PAGE
FOR PARTS)

I. D. PLATE WITH
CIRCUIT DIAGRAM
400960 R. H. ASSY
434311 L. H. ASSY

416834 RIVET (4 REQ'D)

■*⌀591769 PLUG

▲⌀263493 "O" RING

■*⌀113000 PLUG

▲⌀263492 "O" RING

■*⌀591768 PLUG

MODEL	SPOOL
DG3S-8-0A*-*-10	363495
DG3S-8-2A*-*-10	276624
DG3S-8-6A*-*-10	363498
DG3S-8-9A*-*-10	363500
DG3S-8-33A*-*-10	363501

▲263492 "O" RING

■*591768 PLUG

*237588 ORIFICE PLUG
(REMOVE FOR MODELS
WITH "X" IN MODEL CODE)

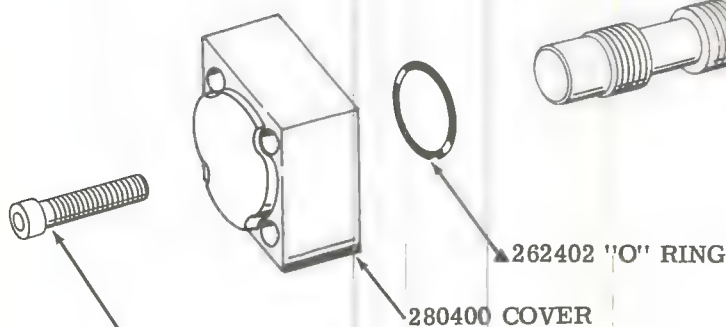
▲262389 "O" RING (2 REQ'D)
(X & Y PORTS)

⌀SPRING (SEE TABLE)

⌀580449 VALVE

⌀580450 SEAT

▲262394 "O" RING (4 REQ'D)
(A, B, P & T PORTS)



◇473784 SCREW (4 REQ'D)
TORQUE TO 49-59 N. m
(36-43.5 lb. ft.)

▲262402 "O" RING

280400 COVER

MODEL	⌀SPRING	COLOR
DG3S-8-*A*-*-K-10	398130	—
DG3S-8-*A*-*-R-10	398131	YELLOW
DG3S-8-*A*-*-S-10	398132	RED

COVER ATTACHING SCREWS		
MODEL	□ SCREW (4 REQ'D)	BOLT KIT
W/OUT PILOT CHOKE	473726	—
WITH PILOT CHOKE	—	466836
TORQUE 4.5-5.7 N.m (39.8 - 50.4 lb. in.)		

NOTE
 - PARTS INCLUDED IN SERVICE KITS WILL NOT BE SOLD SEPARATELY
 - ALL THREADED FASTENERS ARE METRIC
 - END COVER SCREWS ARE METRIC GRADE 12.9

▲262335 "O" RING (2 REQ'D)

262332 "O" RING (4 REQ'D) (REF.)

*471119 SET SCREW (BOND IN PLACE WITH LOCTITE H/S OR EQUIVALENT)

■*591768 PLUG

▲263492 "O" RING

■*⊕591768 PLUG ▲263492 "O" RING

▲263492 "O" RING (2 REQ'D)

■*591768 PLUG (2 REQ'D)

◆400990 BODY (STD)

◆400989 BODY (CHECK VALVE)

199312 REST PIN (2 REQ'D)

■*113000 PLUG (DOES NOT EXIST ON CHECK VALVE MODELS)

ORT

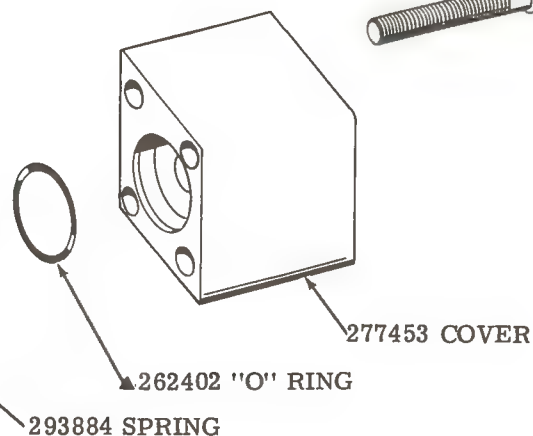
▲263494 "O" RING (2 REQ'D)

■*591770 PLUG (2 REQ'D)

▲263492 "O" RING

■*591768 PLUG

◇470843 SCREW (4 REQ'D)
 TORQUE TO 49-59 N.m
 (36-43.5 lb. ft.)



NOTE
 RIGHT HAND ASSEMBLY SHOWN. FOR LEFT HAND ASSEMBLY, COVERS AND SPRING ARE REVERSED AND I. D. PLATE IS CHANGED.

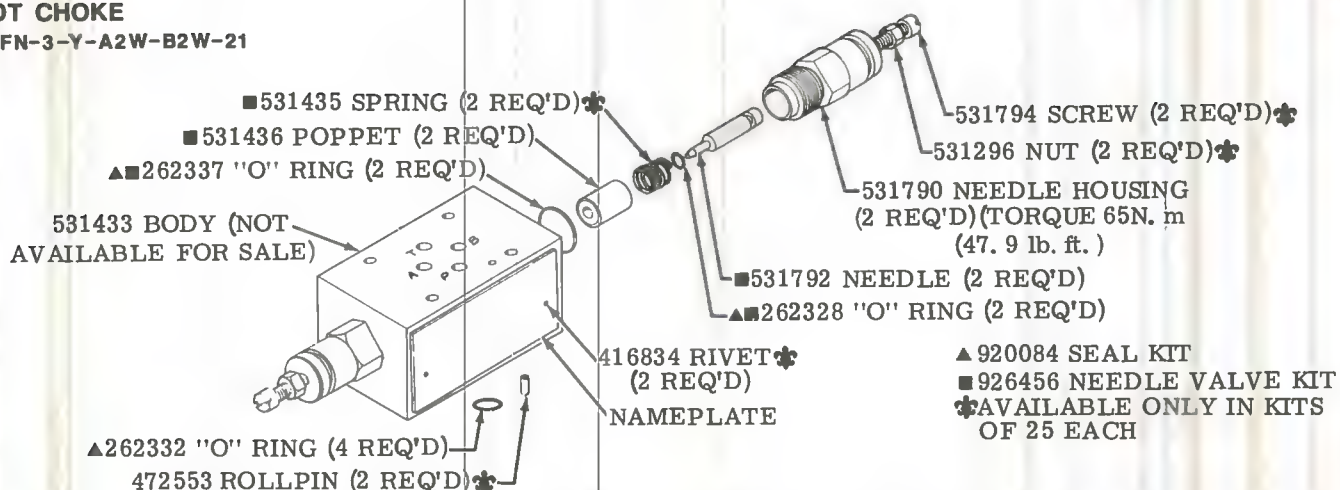
□ INCLUDED IN FASTENER KIT 941164
 ◇ INCLUDED IN FASTENER KIT 941170
 * INCLUDED IN PLUG KIT 941167
 ◆ NOT AVAILABLE FOR SALE
 ⊕ USED ON CHECK VALVE MODELS ONLY

▲SERVICE ALL UNITS
 W/F3 SEAL KIT 920149

PLUG	TORQUE (N.m)	TORQUE (lb. in.)
113000	5.0-5.9	45-52
591768	9.8-10.2	87-90
591769	12.1-12.4	107-110
591770	15.0-16.6	133-147

PILOT CHOKE

DGMFN-3-Y-A2W-B2W-21



MODEL CODE BREAKDOWN

(F3) - D G 3 S - 8 - * A * - * - * - 10 (LH)

SPECIAL SEALS FOR MINERAL OIL OR FIRE RESISTANT FLUID

DIRECTIONAL CONTROL VALVE

SUBPLATE MOUNTING

PILOT OPERATED

RATED PRESSURE
210 bar
(3000 PSI)

INTERFACE
C. E. T. O. P. 8

SPOOL TYPES

SPRING OFFSET

L. H. ASSEMBLY
OFFSET TO "B"
(OMIT FOR R. H.
ASSEMBLY OFF-
SET TO "A")

DESIGN

CHECK VALVE IN PRESSURE
PORT (OMIT WHEN NOT REQ'D)
K - 0.35 bar, (5 PSI)
R - 3.45 bar, (50 PSI)
S - 5.20 bar, (75 PSI)

SPOOL CONTROL MODIFICATION
(OMIT WHEN NOT REQ'D)
2 - PILOT CHOKE ADJUSTMENTS
7 - STROKE ADJUSTMENT CYL-
INDER "A" END ONLY (R. H.)
8 - STROKE ADJUSTMENT CYL-
INDER "B" END ONLY (L. H.)
2-7 IF BOTH ARE REQUIRED
2-8 IF BOTH ARE REQUIRED

"X" - FAST RESPONSE
(OMIT FOR STANDARD
MODELS)

For satisfactory service life of these components, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from Vickers OFP, OFR, and OFRS series are recommended.

Litho in U. S. A.

Service Parts Information

**Pilot
Operated
Directional
Control
Valves**

(F3)-DG3S-8-*C*-*-*-10 Spring Centered
(F3)-DG3S-8-***-*-*-10 No Spring



Vickers, Incorporated

P.O. Box 302
Troy, Michigan 48007-0302

Revised 11-1-85

I-3438-S

MODEL	SPOOL	I. D. PLATE WITH CIRCUIT DIAGRAM	
		SPRING CTR	NO-SPRING
DG3S-8-0(C)*--*-10	363495	400976	400975
DG3S-8-1 C *--*-10	* 276623	400977	—
DG3S-8-2(C)*--*-10	363496	400978	400975
DG3S-8-3 C *--*-10	* 276625	400979	—
DG3S-8-4 C *--*-10	276626	400980	—
DG3S-8-6(C)*--*-10	363498	400981	400975
DG3S-8-8 C *--*-10	363499	400980	—
DG3S-8-9(C)*--*-10	363500	400976	400975
DG3S-8-31 C *--*-10	* 276625	580475	—
DG3S-8-33 C *--*-10	363501	400981	—

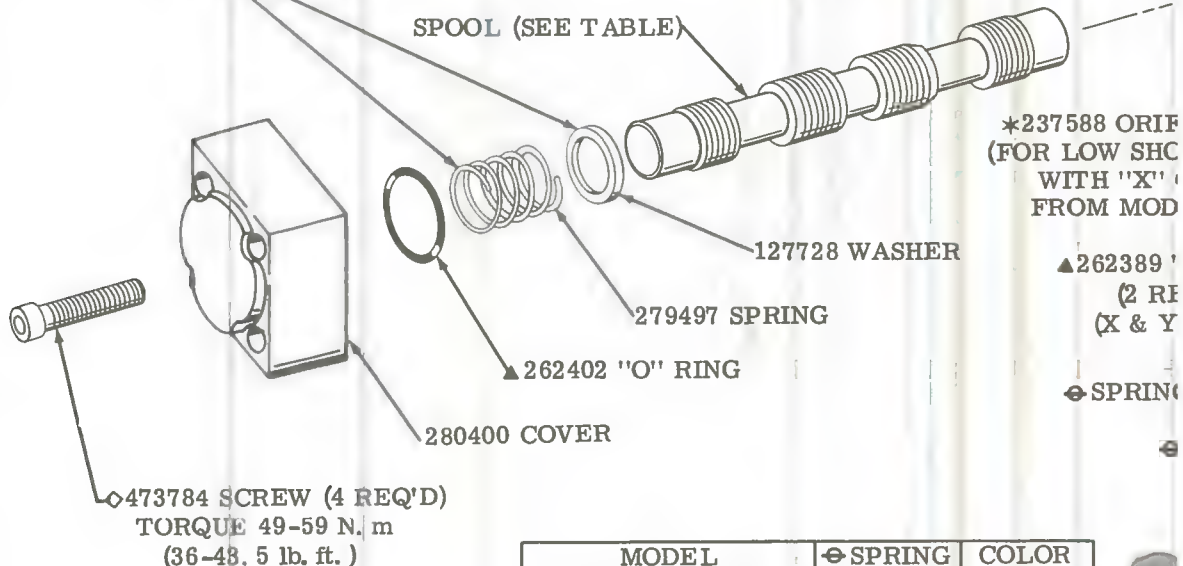
***NOTE**

Assemble type '1' and '3' spools with narrow center land towards "A" end of valve. "A" end of valve is defined as being closest to cylinder port "A". Type '31' spools are installed in reverse of type '3', with narrow center land toward "B" end of valve.

NOTE

- PART NUMBERS INCLUDED IN SERVICE KITS WILL NOT BE SOLD SEPARATELY
- ALL THREADED FASTENERS ARE METRIC
- END COVER SCREWS ARE METRIC GRADE 12. 9

REMOVE ON NO-SPRING MODELS
(BOTH ENDS OF VALVE)



COVER ATTACHING SCREWS		
MODEL	FASTENER KIT	BOLT KIT
WITHOUT PILOT CHOKE	□ 941164	—
WITH PILOT CHOKE	—	466836
KITS INCLUDE (4) SCREWS		
TORQUE TO 4. 5 - 5. 7 N. m (39. 8-50. 4 lb. in.)		

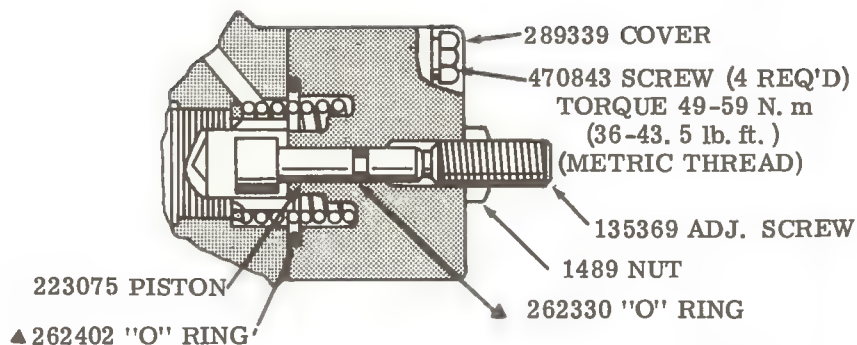
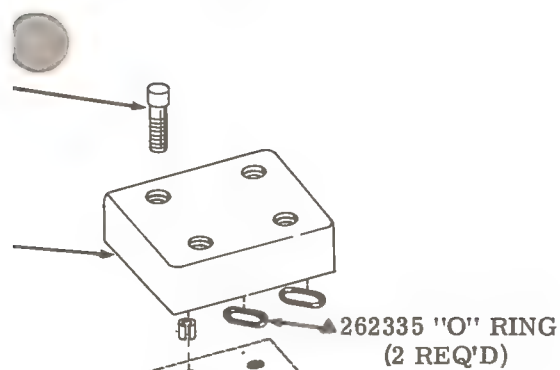
941157 COVER &
ROLLPIN S/A

PILOT CHOKE-
(SEE BACK PAGE
FOR PARTS)

■ PLUG TORQUES (OILED)

PLUG	TORQUE (N. m)	TORQUE (lb. in.)
113000	5. 0- 5. 9	45-52
591768	9. 8-10. 2	87-90
591769	12. 1-12. 4	107-110
591770	15. 0-16. 6	133-147

MODEL	SPRING	COLOR
DG3S-8-*(C)*--K-10	398130	—
DG3S-8-*(C)*--R-10	398131	YELLOW
DG3S-8-*(C)*--S-10	398132	RED



PARTS SHOWN INCLUDED IN STROKE ADJUSTMENT KIT 941154. ORDER TWO KITS IF STROKE ADJUST FOR BOTH ENDS IS REQUIRED.

262335 "O" RING (2 REQ'D)

262332 "O" RING (4 REQ'D) (REF.)

OLLPIN
)" RING
PLUG
RING
PLUG

*591769 PLUG

*471119 SET SCREW (BOND IN PLACE WITH LOCTITE H/S OR EQUIVALENT)

*591768 PLUG ▲263492 "O" RING

*591768 PLUG ▲263492 "O" RING

▲263492 "O" RING (2 REQ'D)

*591768 PLUG (2 REQ'D)

◇473784 SCREW (4 REQ'D)
TORQUE 49-59 N. m
(36-43. 5 lb. ft.)

280400 COVER

▲262402 "O" RING

279497 SPRING
127728 WASHER

REMOVE ON NO-SPRING MODELS (BOTH ENDS)

199312 REST PIN (2 REQ'D)

*113000 PLUG (DOES NOT EXIST ON CHECK VALVE MODELS)

▲263494 "O" RING (2 REQ'D)

*591770 PLUG (2 REQ'D)

▲262492 "O" RING (3 REQ'D)

*591768 PLUG (3 REQ'D)

▲262394 "O" RING (4 REQ'D)
(A, B, P & T PORTS)

▲INCLUDED IN F3 SEAL KIT 920149
◇INCLUDED IN FASTENER KIT 941165
*INCLUDED IN PLUG KIT 941167
◆NOT AVAILABLE FOR SALE
⊕USED ON CHECK VALVE MODELS ONLY

UG
DELS
ED
DE)

"P" PORT

"X" PORT

PORT

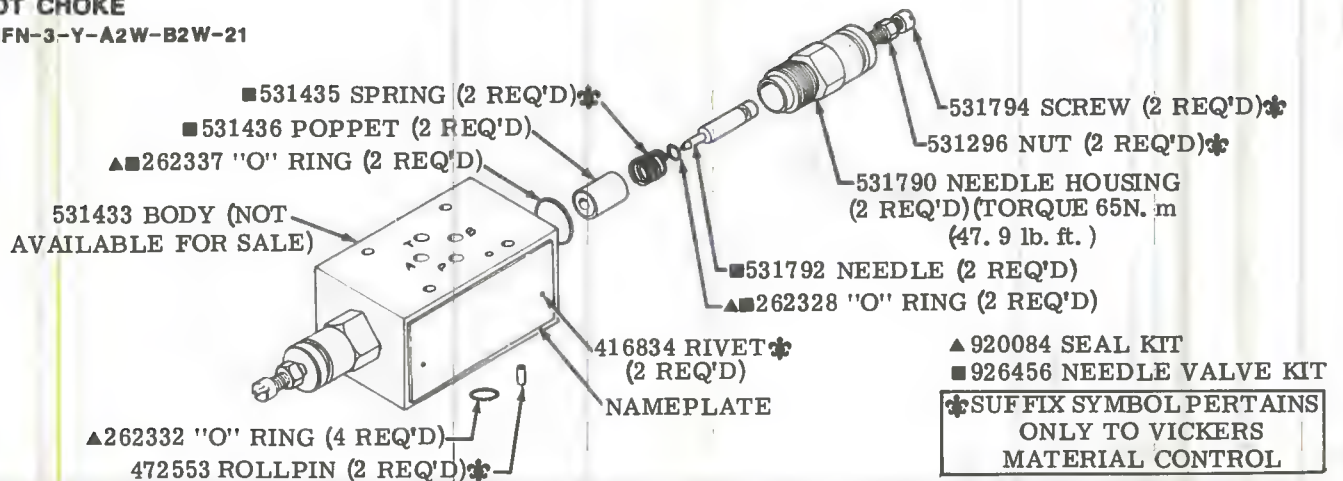
TABLE)

VALVE

50 SEAT

PILOT CHOKE

DGMFN-3-Y-A2W-B2W-21



MODEL CODE BREAKDOWN

(F3) - D G 3 S - 8 - * * * - * - * - 10

SPECIAL SEALS FOR MINERAL OIL OR FIRE RESISTANT FLUID

DIRECTIONAL VALVE

SUBPLATE MOUNTED

PILOT OPERATED

RATED PRESSURE
210 bar
(3000 PSI)

INTERFACE C.E.T.O.P. 8

SPOOL TYPE

DESIGN

CHECK VALVE IN PRESSURE PORT
(OMIT WHEN NOT REQUIRED)

K - 0.35 bar (5 PSI)
R - 3.45 bar (50 PSI)
S - 5.20 bar (75 PSI)

SPOOL CONTROL MODIFICATION
(OMIT WHEN NOT REQUIRED)

1. STROKE ADJUSTMENTS
2. PILOT CHOKE ADJUSTMENTS
3. PILOT CHOKE & STROKE ADJUSTMENTS
7. STROKE ADJUSTMENT, CYLINDER "A" END ONLY
8. STROKE ADJUSTMENT, CYLINDER "B" END ONLY

"X" FAST RESPONSE
(OMIT FOR STANDARD MODELS)

"C" SPRING CENTERED
(OMIT FOR NO-SPRING MODELS)

For satisfactory service life of these components in industrial applications, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from Vickers OFF, OFR, and OFRS series are recommended.

Litho in U. S. A.

Service Parts Information

Manual Lever
Operated
Directional
Valve

DG17S-8-*A-10

DG17S-8-*C-10

DG17S-8-*N-10



Vickers, Incorporated

1401 Crooks Road
Troy, Michigan 48084

Revised 9-1-85

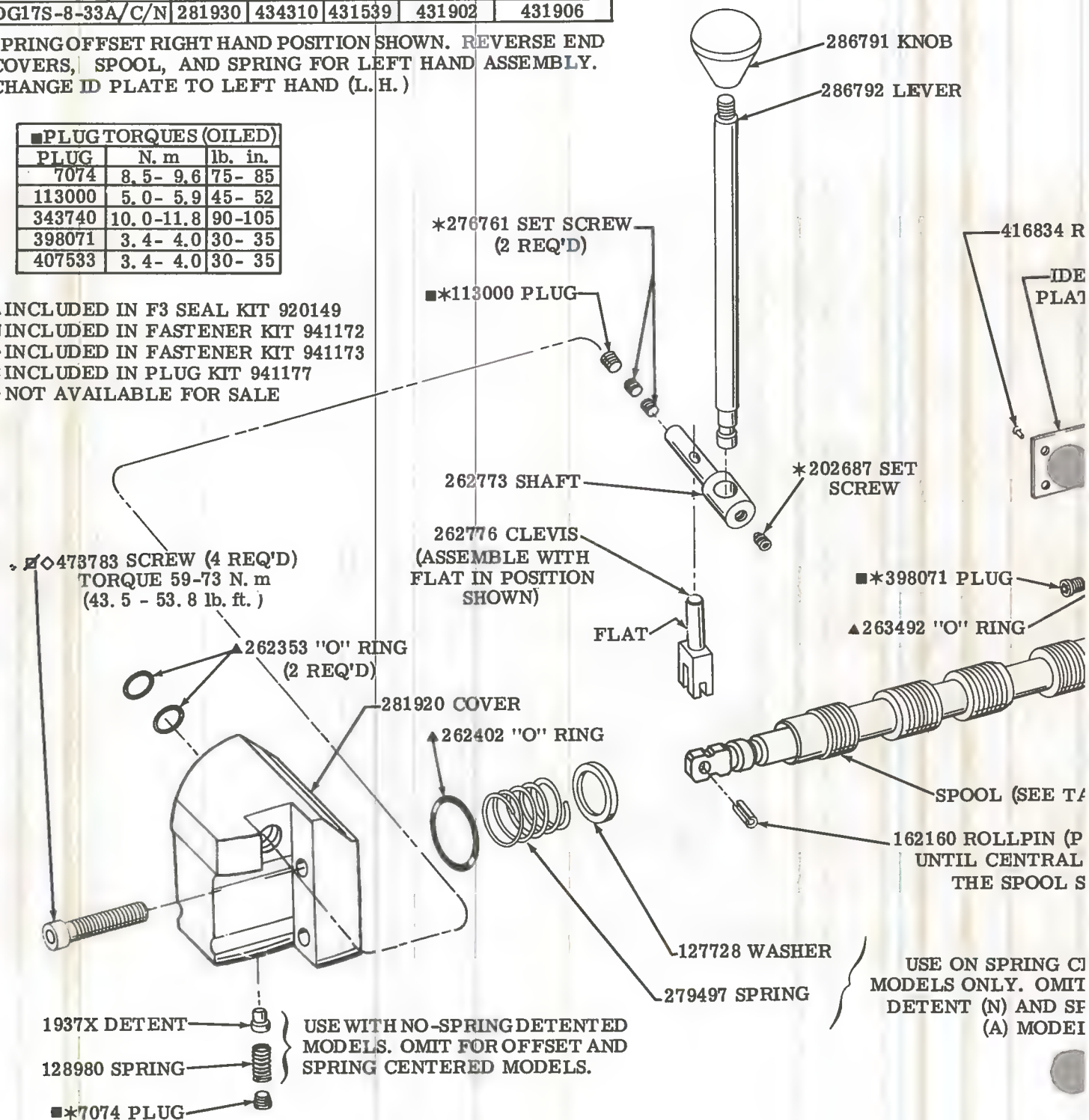
I-3441-S

MODEL	SPOOL	ID PLATE WITH CIRCUIT DIAGRAM			
		OFFSET (A)		SPRING	NO-SPRING
		L. H.	R. H.	CENT. (C)	DETENT (N)
DG17S-8-0A/C/N	281922	434310	431539	431900	431903
DG17S-8-2A/C/N	281924			431540	431541
DG17S-8-3C/N	320915			431901	431904
DG17S-8-4C/N	281926			431549	431905
DG17S-8-6A/C/N	281927	434310	431539	431902	431906
DG17S-8-8C/N	281929			431459	431905
DG17S-8-33A/C/N	281930	434310	431539	431902	431906

SPRING OFFSET RIGHT HAND POSITION SHOWN. REVERSE END COVERS, SPOOL, AND SPRING FOR LEFT HAND ASSEMBLY. CHANGE ID PLATE TO LEFT HAND (L. H.)

■ PLUG TORQUES (OILED)		
PLUG	N. m	lb. in.
7074	8.5- 9.6	75- 85
113000	5.0- 5.9	45- 52
343740	10.0-11.8	90-105
398071	3.4- 4.0	30- 35
407533	3.4- 4.0	30- 35

- ▲ INCLUDED IN F3 SEAL KIT 920149
- ✱ INCLUDED IN FASTENER KIT 941172
- ◇ INCLUDED IN FASTENER KIT 941173
- * INCLUDED IN PLUG KIT 941177
- ◆ NOT AVAILABLE FOR SALE



- NOTE**
- PARTS INCLUDED IN SERVICE KITS WILL NOT BE SOLD SEPARATELY
 - ALL THREADED FASTENERS ARE METRIC
 - END COVER SCREWS ARE METRIC GRADE 12. 9

(USED ON SPRING CENTERED (C) MODELS ONLY)

279497 SPRING

127728 WASHER

▲262402 "O" RING

280400 COVER

◇473784 SCREW (4 REQ'D)
TORQUE 49-59 N. m
(36-43.5 lb. ft.)

PARTS USED ON
NO-SPRING DETENTED (N)
& SPRING CENTERED (C)
MODELS ONLY

(4 REQ'D)

CATION
E TABLE)

■*407533 PLUG

▲263493 "O" RING

*66609 ORIFICE PLUG

▲263492 "O" RING

■*398071 PLUG

◆BODY	SPOOL
431094	0, 2, 3, 6 & 33
431402	4 & 8

◇470843 SCREW (4 REQ'D)
TORQUE 49-59 N. m
(36 - 43.5 lb. ft.)

'IN
N

ED (C)
>-SPRING
OFFSET

■*343740 PLUG

▲263494 "O" RING

■*343740 PLUG

▲263494 "O" RING

199312 REST PIN (2 REQ'D)

▲262394 "O" RING (4 REQ'D)
(A, B, P & T PORTS)

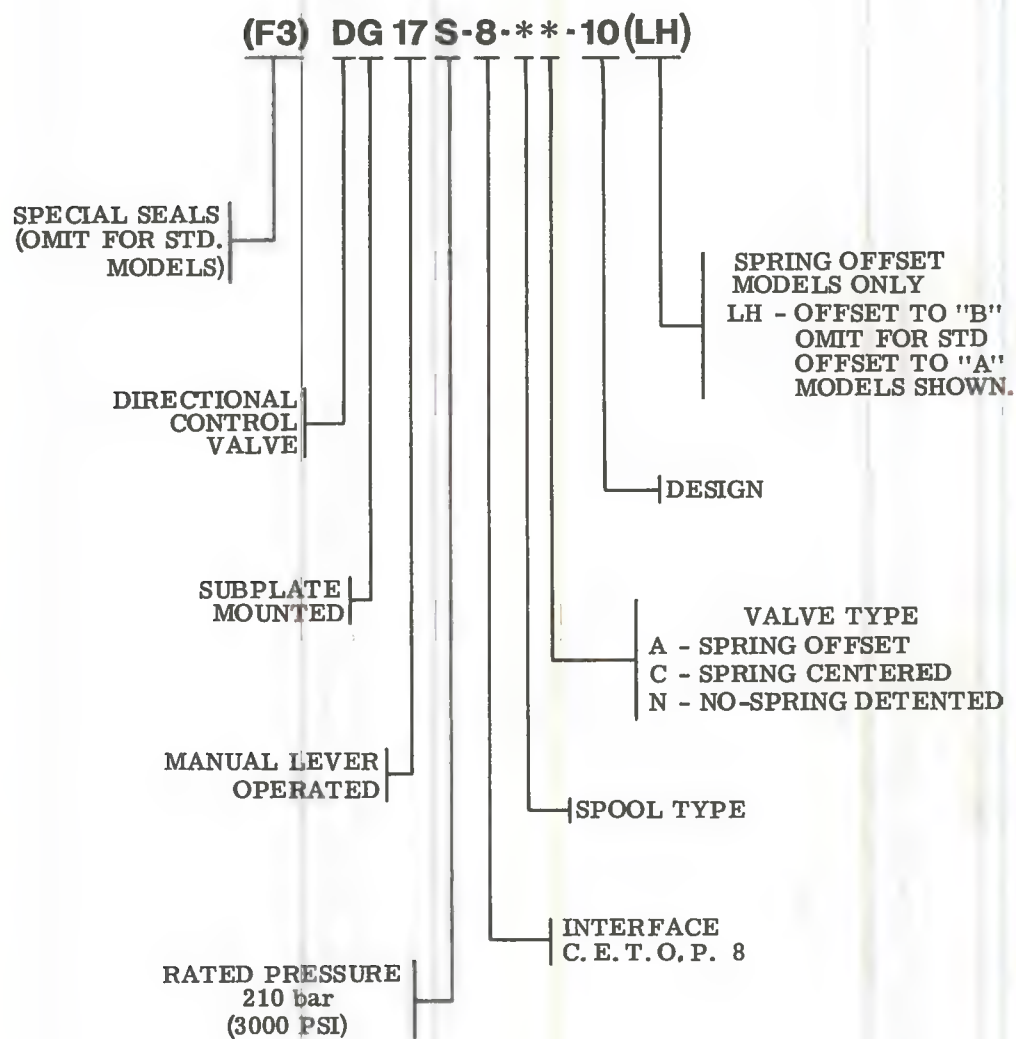
277453 COVER

▲262402 "O" RING

293884 SPRING

PARTS FOR "A"
OFFSET MODELS ONLY)

MODEL CODE BREAKDOWN



For satisfactory service life of these components, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from Vickers OFP, OFR, and OFRS series are recommended.

Litho in U. S. A.

Service Parts Information

**Air
Operated
Directional
Valves**

DG18S-8-*A-10(LH)
DG18S-8-*C-10
DG18S-8-* -10



Vickers, Incorporated

1401 Crooks Road
Troy, Michigan 48084

Revised 12-1-87

I-3442-S

MODEL	SPOOL	I. D. PLATES WITH CIRCUIT DIAGRAM			
		NO SPRING	SPRING CTR'D	SPRING OFFSET	
				L. H.	R. H.
DG18S-8-0*-10	363495	434313	431907	434312	431557
DG18S-8-1*-10	*276623	—	431908	—	—
DG18S-8-2*-10	363496	434313	431555	—	—
DG18S-8-2A-10	276624	—	—	434312	431557
DG18S-8-3*-10	*276625	—	431909	—	—
DG18S-8-4*-10	276626	—	431556	—	—
DG18S-8-6*-10	363498	434313	431910	434312	431557
DG18S-8-8*-10	363499	—	431556	—	—
DG18S-8-9*-10	363500	—	431907	—	—
DG18S-8-33*-10	363501	434313	431910	434312	431557

R. H. ASSEMBLY SHOWN. FOR L. H. ASSEMBLY, AIR OPERATED END PARTS & SPRING OFFSET PARTS ARE INTERCHANGED. ALSO, THE R. H. PLATE IS REMOVED AND REPLACED BY THE L. H. I. D. PLATE.

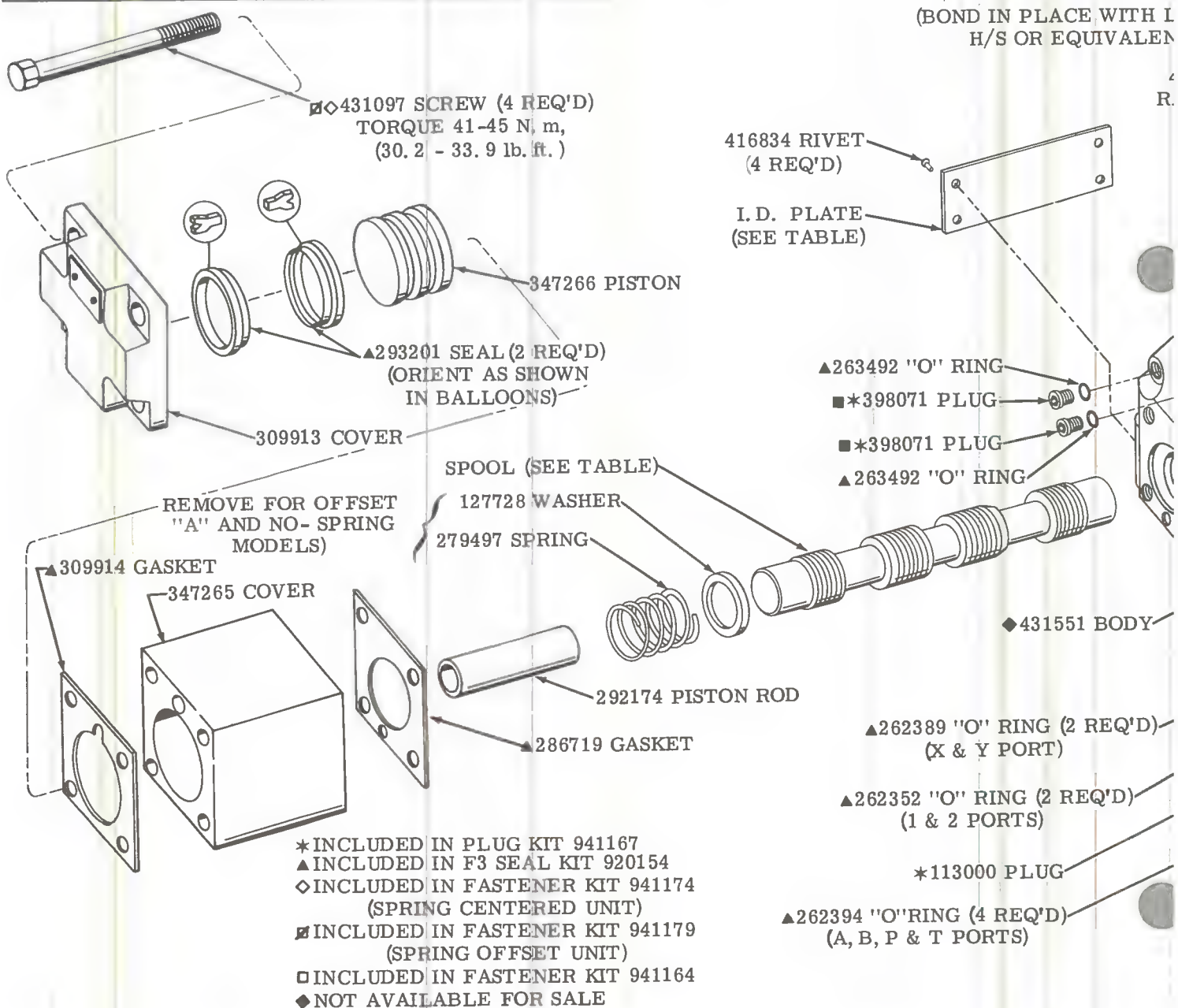
NOTE

- PARTS INCLUDED IN SERVICE KITS WILL NOT BE SOLD SEPARATELY.
- ALL THREADED FASTENERS ARE METRIC.
- END COVER SCREWS ARE METRIC GRADE 12. 9.

■ PLUG TORQUES

PLUG	TORQUE (N. m.)	TORQUE (lb. in.)
343740	10.0 - 11.8	90 - 105
398071	3.4 - 4.0	30 - 35
407533	3.4 - 4.0	30 - 35

*** NOTE**
ASSEMBLE TYPE "1" & "3" SPOOLS WITH NARROW CENTER LAND TOWARD "A" END OF VALVE. "A" END OF VALVE IS DEFINED AS BEING CLOSEST TO CYLINDER PORT "A".



473726 SCREW (4 REQ'D)
TORQUE 4.5 - 5.7 N.m
(38.9 - 50.4 lb. in.)

293201 SEAL (2 REQ'D)
(ORIENT AS SHOWN
IN BALLONS)

347266 PISTON

309914 GASKET

431093 COVER

262344 "O" RING

REMOVE FOR
NO-SPRING
MODELS

279497 SPRING

127728 WASHER

*398071 PLUG

263492 SEAL

263492 "O" RING

*398071
PLUG

*398071 PLUG

263492 "O" RING

199312 REST PIN
(2 REQ'D)

263492 "O" RING

*398071 PLUG

"P"
PORT

263494 "O" RING

*343740 PLUG

263494 "O" RING

*343740 PLUG

263492 "O" RING

*398071 PLUG

263492 "O" RING

*398071 PLUG

431097 SCREW (4 REQ'D)
TORQUE 41-45 N.m
(30.2 - 33.19 lb. ft.)

36212 SCREW
(4 REQ'D)

431401 CAUTION
PLATE
(2 REQ'D)

309913 COVER

347265 COVER

286719 GASKET

292174 PISTON ROD

OFFSET VALVE
END PARTS

470843 SCREW
(4 REQ'D)
TORQUE 49-59 N.m
(36 - 43.5 lb. ft.)

277453 COVER

286719 GASKET

293884 SPRING

MODEL CODE BREAKDOWN

(F3) DG 18 S - 8 - ** - 10 (LH)

SPECIAL SEALS FOR MINERAL
OIL OR FIRE RESISTANT FLUID

DIRECTIONAL
CONTROL
VALVE

SUBPLATE
MOUNTED

AIR
OPERATED

RATED PRESSURE
210 bar
(3000 PSI)

LEFT HAND
ASSEMBLY
(SPRING OFFSET
MODELS ONLY)

DESIGN NUMBER

A - SPRING OFFSET
C - SPRING CENTERED
OMIT - NO-SPRING

SPOOL TYPE

INTERFACE
C. E. T. O. P. 8

For satisfactory service life of these components, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from Vickers OFP, OFR, and OFRS series are recommended.

Litho in U. S. A.

Service Parts Information

Pilot
Operated
Directional
Control
Valves

(F3)-DG3S-H8-*A*-*-20(LH)



Vickers, Incorporated

P.O. Box 302
Troy, Michigan 48007-0302

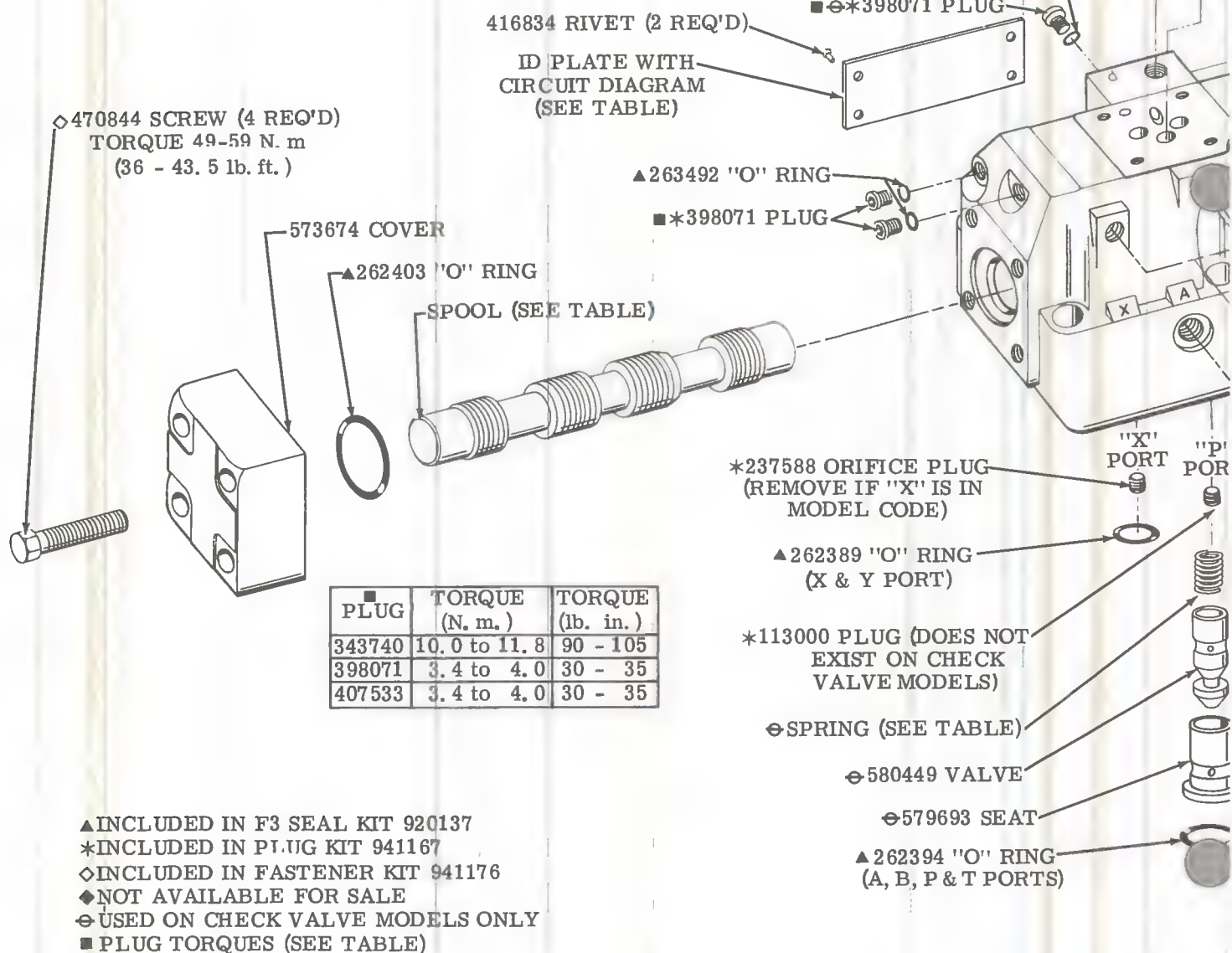
Revised 11-1-85

I-3443-S

NOTE	
- PARTS INCLUDED IN SERVICE KITS WILL NOT BE SOLD SEPARATELY	
- ALL THREADED FASTENERS ARE METRIC	
- END COVER SCREWS ARE METRIC GRADE 12. 9	

INCLUDED IN 941157 COVER & REST PIN S/A { 400982 COVER
472553 REST PIN

MODEL	SPOOL	ID PLATE	
		L. H.	R. H.
DG3S-H8-0A*-*-20	786350		
DG3S-H8-2A*-*-20	786349		
DG3S-H8-6A*-*-20	786559	434311	400960
DG3S-H8-9A*-*-20	786561		
DG3S-H8-33A*-*-20	786562		



BOLT KIT	MODEL
466834	WITHOUT PILOT CHOKE
466836	WITH PILOT CHOKE
TORQUE 4.5 - 5.7 N. m (39.6 - 50.4 lb. ft.)	

▲262335 "O" RING (2 REQ'D)

PILOT CHOKE
DGMFN-3-Y-A2W-B2W-21
(SEE MODEL CODE PAGE FOR
PARTS DESCRIPTION)

262332 "O" RING (4 REQ'D) (REF.)

19 PLUG (BOND IN PLACE WITH
EPOXY RESIN OR EQUIVALENT)

■*398071 PLUG

▲263492 "O" RING

▲263492 "O" RING

*■398071 PLUG

▲263492 "O" RING

*■398071 PLUG

▲263492 "O" RING

*■398071 PLUG

▲263492 "O" RING

*■398071 PLUG

▲263492 "O" RING

*■398071 PLUG

▲263492 "O" RING

*■398071 PLUG

▲263492 "O" RING

*■398071 PLUG

▲263492 "O" RING

*■398071 PLUG

▲263492 "O" RING

*■398071 PLUG

▲263492 "O" RING

*■398071 PLUG

▲263492 "O" RING

*■398071 PLUG

▲263492 "O" RING

*■398071 PLUG

▲263492 "O" RING

*■398071 PLUG

▲263492 "O" RING

*■398071 PLUG

▲263492 "O" RING

*■398071 PLUG

▲263492 "O" RING

*■398071 PLUG

▲263492 "O" RING

*■398071 PLUG

▲263492 "O" RING

*■398071 PLUG

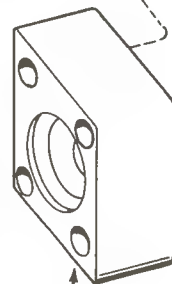
▲263492 "O" RING

*■398071 PLUG

▲263492 "O" RING

*■398071 PLUG

◇470853 SCREW (4 REQ'D)
TORQUE 49-59 N. m
(36 - 43.5 lb. ft.)



573674 COVER

▲262403 "O" RING

787965 STOP

787962 MIDDLE COVER

▲262403 "O" RING

783695 SPRING

786523 WASHER

787963 SPACER

573675 BODY (STD)

577493 BODY
(CHECK VALVE)

199312 REST PIN(2 REQ'D)

▲263493 "O" RING

*■343740 PLUG

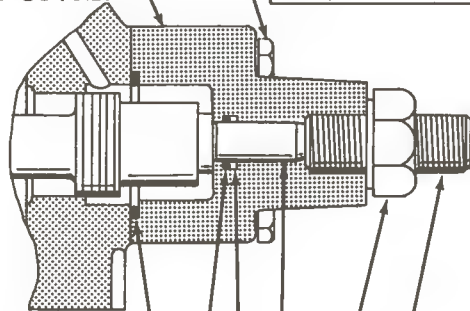
263494 "O" RING

*■398071 PLUG

470844 SCREW (4 REQ'D)
TORQUE 49-59 N. m
(36-43.5 lb. ft.)

787125 COVER

PARTS SHOWN INCLUDED
IN 941156 STROKE ADJ-
USTMENT KIT. ONE KIT
REQUIRED.



▲262403 "O" RING

▲262335 "O" RING

▲197573 BACK-UP RING

787127 PISTON

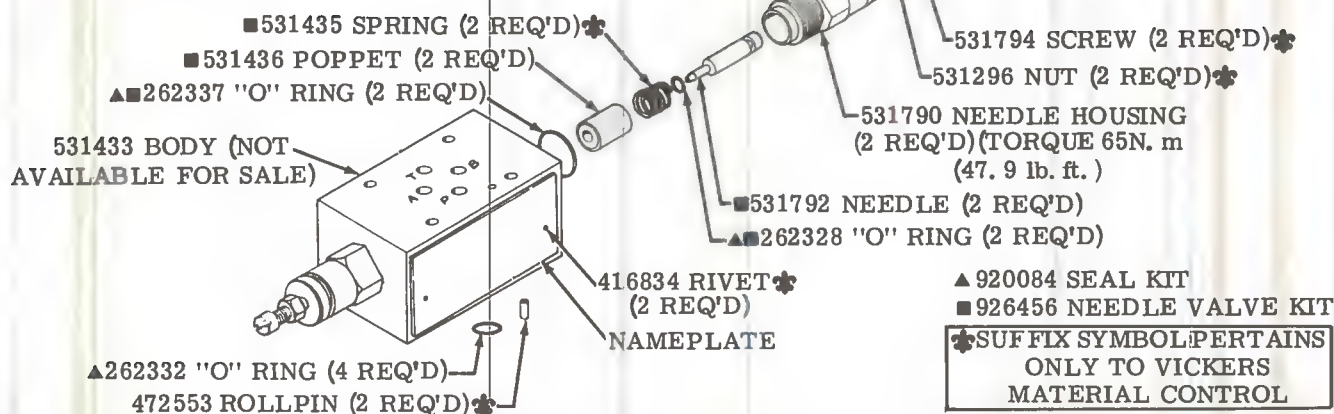
470684 NUT

471207 ADJ. SCREW

MODEL	SPRING	COLOR CODE
DG3S-H8-**-**-K-**-10	398130	
DG3S-H8-**-**-R-**-10	398131	YELLOW
DG3S-H8-**-**-S-**-10	398132	RED

PILOT CHOKE

DGMFN-3-Y-A2W-B2W-21



MODEL CODE BREAKDOWN

(F3) - D G 3 S - H 8 - * A * - * - * - 2 0 (LH)

SPECIAL SEALS FOR
MINERAL OIL OR
FIRE RESISTANT
FLUID

DIRECTIONAL
CONTROL
VALVE

SUBPLATE MOUNTED

PILOT OPERATED

RATED PRESSURE
210 bar
(3000 PSI)

(HIGH FLOW) INTERFACE
C. E. T. O. P. 8

SPOOL TYPE

VALVE TYPE
SPRING OFFSET

OFFSET TO "B"
(OMIT FOR STD
OFFSET TO "A"
MODELS)

DESIGN

CHECK VALVE
IN PRESSURE PORT
K - 0.35 bar (5 PSI)
S - 5.20 bar (75 PSI)

SPOOL CONTROL MODIFICATION
2 - PILOT CHOKE ADJUSTMENTS
7 - STROKE ADJUSTMENT CYL-
INDER "A" END ONLY (FOR
RIGHT HAND MODELS)
8 - STROKE ADJUSTMENT CYL-
INDER "B" END ONLY (FOR
LEFT HAND MODELS)
2-7 IF BOTH ARE REQUIRED
2-8 IF BOTH ARE REQUIRED

"X" FAST RESPONSE
(OMIT FOR STANDARD
MODELS)

For satisfactory service life of these components in industrial applications, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from Vickers OFP, OFR, and OFRS series are recommended.

Litho in U. S. A.

Service Parts Information

**Pilot
Operated
Directional
Control
Valves**

DG3S-H8-*C*-*-20 Spring Centered
DG3S-H8-*-*-20 No Spring



Vickers, Incorporated

P.O. Box 302
Troy, Michigan 48007-0302

Revised 11-1-85

I-3444-S

*** NOTE**
 ASSEMBLE TYPE 1 AND 3 SPOOLS WITH NARROW CENTER LAND TOWARD "A" END OF VALVE. "A" END OF VALVE IS DEFINED AS BEING CLOSEST TO CYLINDER PORT "A". THE TYPE 31 SPOOL IS INSTALLED IN REVERSE OF TYPE 3, WITH NARROW CENTER LAND TOWARD "B" END OF VALVE.

MODEL	SPOOL	ID PLATE	
		"C"	NO-SPRING
DG3S-H8-0(C)*-*-20	786350	400976	400975
DG3S-H8-1C)*-*-20	*786557	400977	—
DG3S-H8-2(C)*-*-20	786349	400978	400975
DG3S-H8-3C)*-*-20	*786558	400979	—
DG3S-H8-4C)*-*-20	628162	400980	—
DG3S-H8-6(C)*-*-20	786559	400981	400975
DG3S-H8-8C)*-*-20	627221	400980	—
DG3S-H8-9(C)*-*-20	786561	400976	400975
DG3S-H8-31C)*-*-20	*786558	580475	—
DG3S-H8-33C)*-*-20	786562	400981	—

■ PLUG TORQUES (OILED)		
PLUG	TORQUE (N. m)	TORQUE (lb. in.)
113000	5.0 - 5.9	45 - 52
591768	9.8 - 10.2	87 - 90
591769	12.1 - 12.4	107 - 110
591770	15.0 - 16.6	133 - 147

INCLUDED IN 941157 COVER & REST PIN S/A

- 400982 COVER
- 472552 REST PIN

PILOT CHOKE
 DGMFN-3-Y-A2W-B2W-21
 (SEE MODEL CODE PAGE FOR PARTS DESCRIPTION)

- * 591769 PLUG
- ▲ 263493 "O" RING
- * 113000 PLUG
- 263492 "O" RING
- * 591768 PLUG

416834 RIVET (4 REQ'D)

ID PLATE WITH CIRCUIT DIAGRAM (SEE TABLE)

▲ 263492 "O" RING

■ * 591768 PLUG

◇ 470844 SCREW (4 REQ'D)
 TORQUE 49-59 N. m
 (36 - 43.5 lb. ft.)

SPOOL (SEE TABLE)

REMOVE SPRING & WASHER FROM BOTH ENDS OF VALVE ON NO-SPRING MODELS

786523 WASHER

783665 SPRING

▲ 262403 "O" RING

573674 COVER

* 237588 ORIFICE PLUG
 (REMOVE FOR MODELS WITH "X" IN MODEL CODE)

▲ 262389 "O" RING
 (X & Y PORTS)

⊖ SPRING (SEE TABLE)

⊖ 580449 VALVE

- ▲ INCLUDED IN F3 SEAL KIT 920137
- * INCLUDED IN PLUG KIT 941167
- INCLUDED IN FASTENER KIT 941164
- ◇ INCLUDED IN FASTENER KIT 941175
- ◆ NOT AVAILABLE FOR SALE
- ⊖ USED ON CHECK VALVE MODELS ONLY

MODEL	⊖ SPRING	COLOR
DG3S-H8-*(C)*-*-K-20	398130	—
DG3S-H8-*(C)*-*-R-20	398131	YELLOW
DG3S-H8-*(C)*-*-S-20	398132	RED

MODEL	□ SCREW (4 REQ'D)	BOLT KIT
W/OUT PILOT CHOKE	473726	—
WITH PILOT CHOKE	—	466836
BOLT KIT INCLUDES (4) BOLTS		
TORQUE TO 4.5 - 5.7 N. m (39.8 - 50.4 lb. in.)		

NOTE

- PARTS INCLUDED IN SERVICE KITS WILL NOT BE SOLD SEPARATELY
- ALL THREADED FASTENERS ARE METRIC
- END COVER SCREWS ARE METRIC GRADE 12.9

▲262335 "O" RING (2 REQ'D)

262332 "O" RING (4 REQ'D) (REF.)

*471119 SET SCREW BOND IN PLACE
WITH LOCTITE H/S OR EQUIVALENT.

■*591768 PLUG

▲263492 "O" RING

*○263492 "O" RING

■*591768 PLUG

▲263492 "O" RING

■*591768 PLUG

199312 REST PIN (2 REQ'D)

*113000 PLUG
DOES NOT EXIST ON
CHECK VALVE MODELS

"P"
PORT

▲263494 "O" RING

■*591770 PLUG

▲263492 "O" RING

○579693 SEAT

▲262394 "O" RING
(A, B, P & T PORTS)

■*591768 PLUG

◇470844 SCREW (4 REQ'D)
TORQUE 49-59 N. m
(36 - 43.5 lb. ft.)

573674 COVER

▲262403 "O" RING

783665 SPRING
786523 WASHER

REMOVE FROM BOTH
ENDS OF VALVE ON
NO-SPRING MODELS

PARTS SHOWN INCLUDED IN 941156 STROKE
ADJ KIT. ORDER TWO KITS IF STROKE ADJ
FOR BOTH ENDS IS REQUIRED.

470844 SCREW (4 REQ'D)
TORQUE 49-59 N. m
(36 - 43.5 lb. ft.)

787125 COVER

▲262403 "O" RING

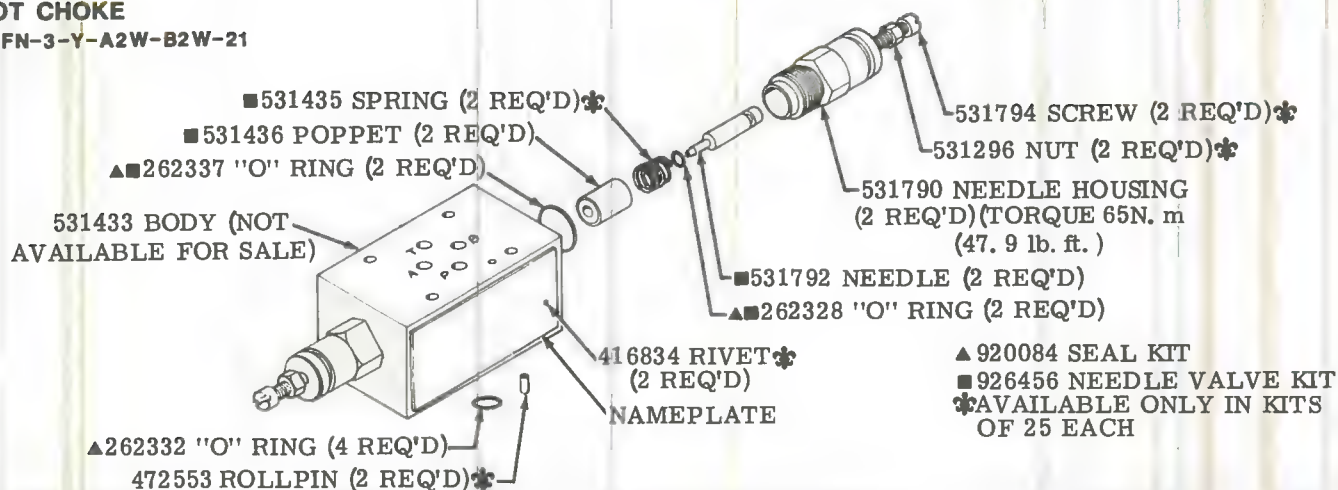
470684
NUT

471207 ADJ.
SCREW

▲262335 "O" RING
▲197573 BACK-UP RING
787127 PISTON

PILOT CHOKE

DGMFN-3-Y-A2W-B2W-21



MODEL CODE BREAKDOWN

(F3) - D G 3 S - H 8 - * * * - * * * - 20 (LH)

SEALS FOR
MINERAL OIL
AND FIRE
RESISTANT
FLUIDS

DIRECTIONAL
VALVE

SUBPLATE
MOUNTED

PILOT
OPERATED

RATED PRESSURE
210 bar
(3000 PSI)

HIGH FLOW
INTERFACE
C. E. T. O. P. 8

SPOOL TYPE

VALVE TYPE
C - SPRING CENTERED
OMIT FOR NO-SPRING
MODELS

OFFSET TO "B"
OMIT FOR STD.
OFFSET TO "A"
MODELS.

DESIGN

CHECK VALVE IN
PRESSURE PORT
K - 0.35 bar (5 PSI)
S - 5.20 bar (75 PSI)

SPOOL CONTROL MODIFICATION
(OMIT WHEN NOT REQUIRED)
1 - STROKE ADJUSTMENT
2 - PILOT CHOKE
3 - PILOT CHOKE AND STROKE
ADJUSTMENTS
7 - STROKE ADJUSTMENT "A"
END ONLY
8 - STROKE ADJUSTMENT "B"
END ONLY

"X" - FAST RESPONSE MODEL
OMITTED - STANDARD MODELS

For satisfactory service life of these components in industrial applications, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from Vickers OFP, OFR, and OFRS series are recommended.

Service Parts Information

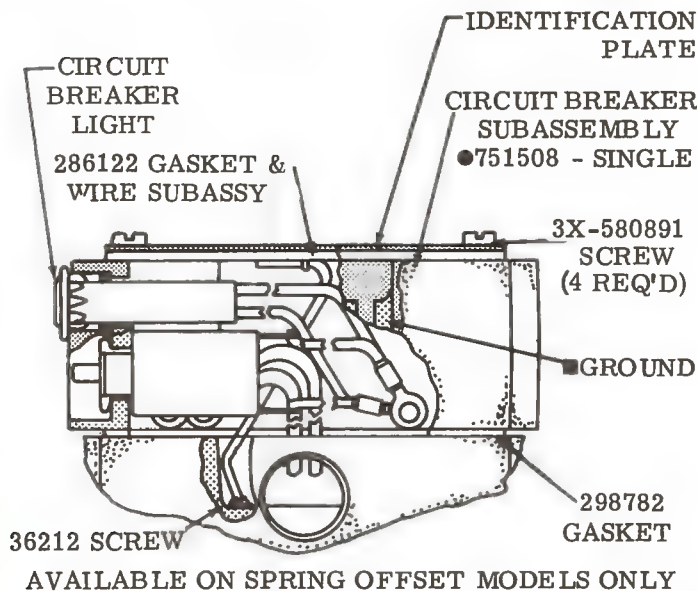
**DIRECTIONAL
VALVES
ELECTRICAL
ACCESSORIES**

VICKERS®

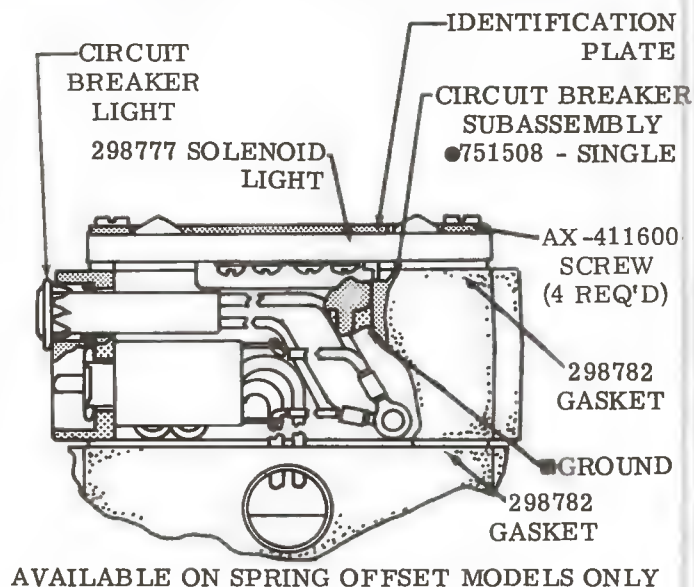
A TRIMOVA COMPANY

SINGLE SOLENOID

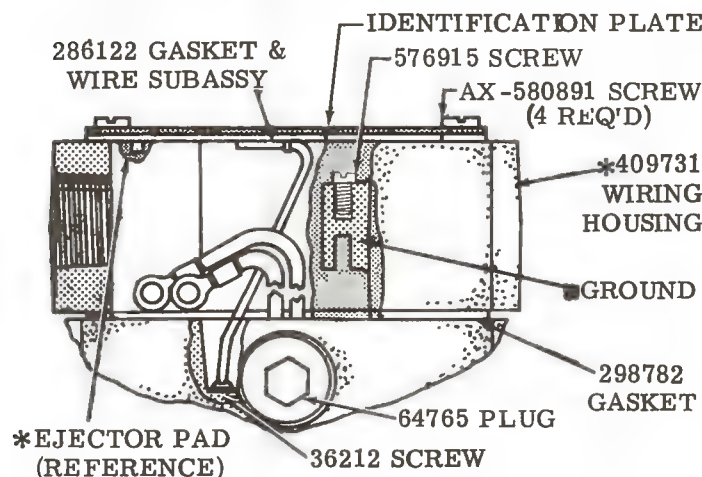
MODEL: DF or DG*S*B - CIRCUIT BREAKER



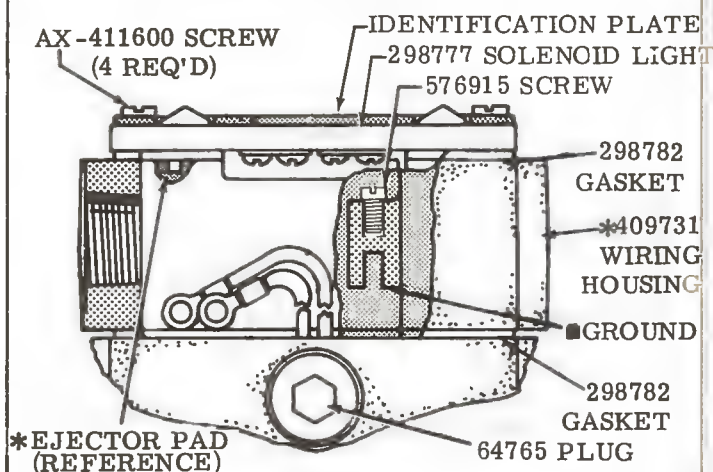
SINGLE SOLENOID DOUBLE SOLENOID REQUIRES "LWB" MODEL: DF or DG*S*LB - CIRCUIT BREAKER & SOLENOID LIGHTS



▲942332 - SINGLE/DOUBLE SOLENOID MODEL: DF or DG*S*W - WIRING HOUSING



▲942335 - SINGLE/DOUBLE SOLENOID MODEL: DF or DG*S*W - WIRING HOUSING



- ASSEMBLE WITH CIRCUIT BREAKER AND LIGHT OVER SOLENOID.

ELECTRICAL CIRCUIT DIAGRAM IS SHOWN ON UNDERSIDE OF IDENTIFICATION PLATE.

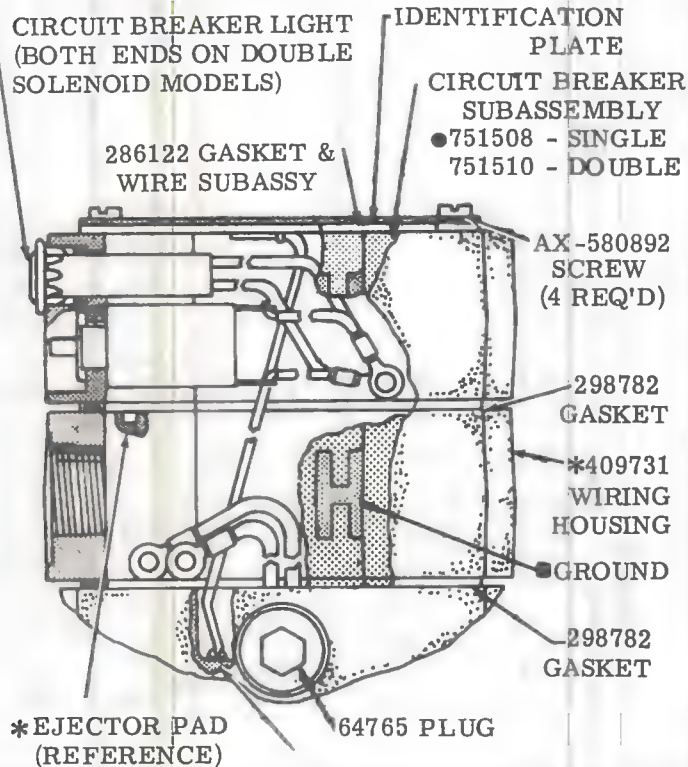
NOTE: CIRCUIT BREAKER OPTION IS NOT AVAILABLE WITH WET ARMATURE SOLENOID VALVES.

- GROUND PROVIDED FOR #8 SELF-TAPPING SCREW FOR CUSTOMERS CONVENIENCE. THE HOUSINGS MAY BE CONNECTED TOGETHER AND GROUNDED TO THE DG-01 BODY.

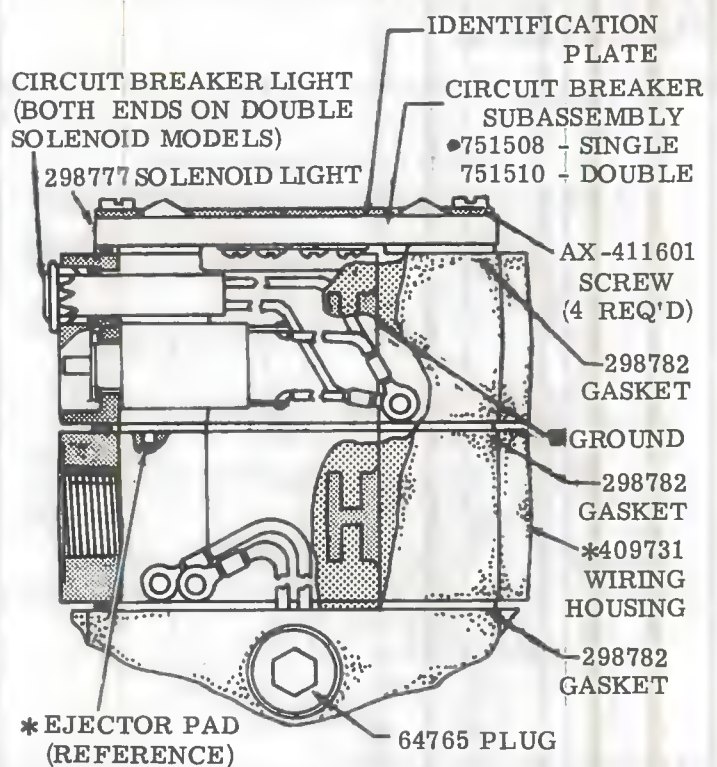
- ▲ SERVICE KITS INCLUDE ALL PARTS SHOWN.

SINGLE SOLENOID
DOUBLE SOLENOID
MODEL: DF or DG*S*WB

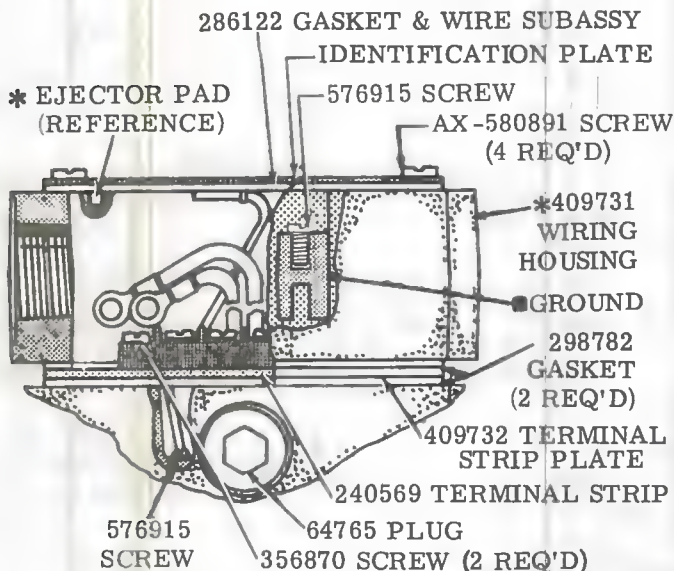
WIRING HOUSING & CIRCUIT BREAKER



SINGLE SOLENOID
DOUBLE SOLENOID
MODEL: DF or DG*S*LWB SOLENOID LIGHT
WIRING HOUSING & CIRCUIT BREAKER

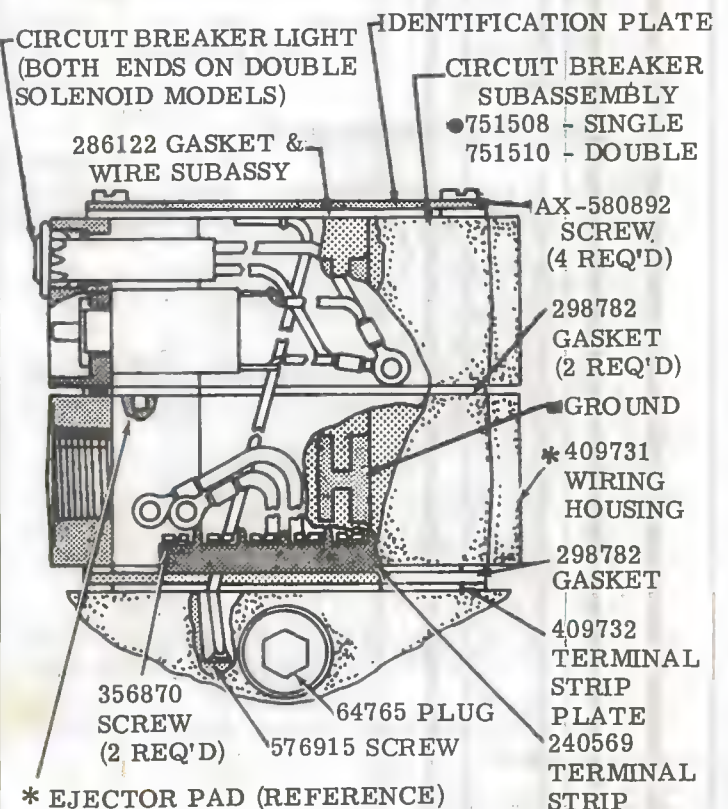


SINGLE/DOUBLE SOLENOID
MODEL: DF or DG*S*WT
WIRING HOUSING & TERMINAL STRIP



*#409731 WIRING HOUSING
ASSEMBLE HOUSING WITH EJECTOR PADS UP AND
WITH ELECTRICAL CONDUIT CONNECTION OVER
SOLENOID "B". (SOLENOIDS "A" & "B" ARE IDENTI-
FIED ON UNITS BY DIAGRAM PLATE ON SIDE OF
PILOT VALVE. FOR TYPE "4" & "8" SPOOLS CON-
DUIT CONNECTION LOCATION ON END OF "W" WIR-
ING HOUSING IS REVERSED).

SINGLE SOLENOID
DOUBLE SOLENOID
MODEL: DF or DG*S*WTB TERMINAL STRIP
WIRING HOUSING & CIRCUIT BREAKER



Service Parts Information

VICKERS

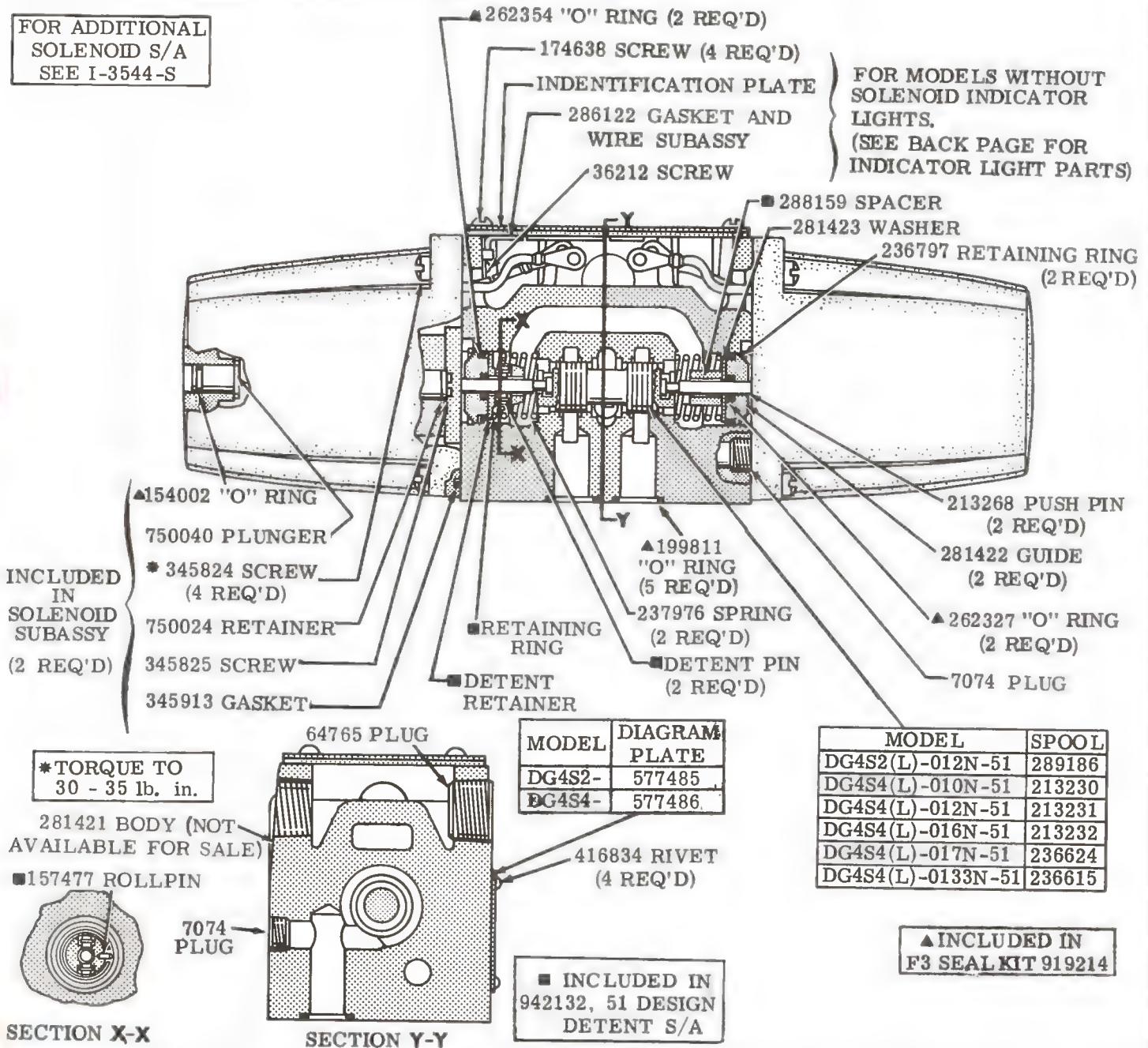
A TRIMONA COMPANY

NO-SPRING DETENTED SOLENOID CONTROLLED DIRECTIONAL VALVES

DG4S*(L)-01*N-(***AC)*-51

VOLTAGE	SOLENOID S/A	COIL S/A	SOLENOID S/A F3	COIL S/A F3
115 AC 60	281291	316011	317767	317768
230 AC 60	281292	298721	317769	317770
460 AC 60	281293	298722	317771	317772

FOR ADDITIONAL
SOLENOID S/A
SEE I-3544-S



Vickers, Incorporated
P.O. Box 302
Troy, Michigan 48007-0302

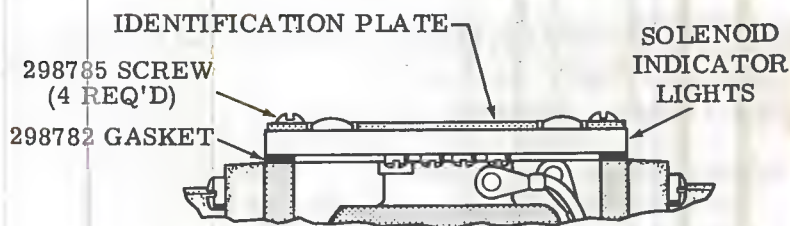
Revised 9-1-87

I-3471-S

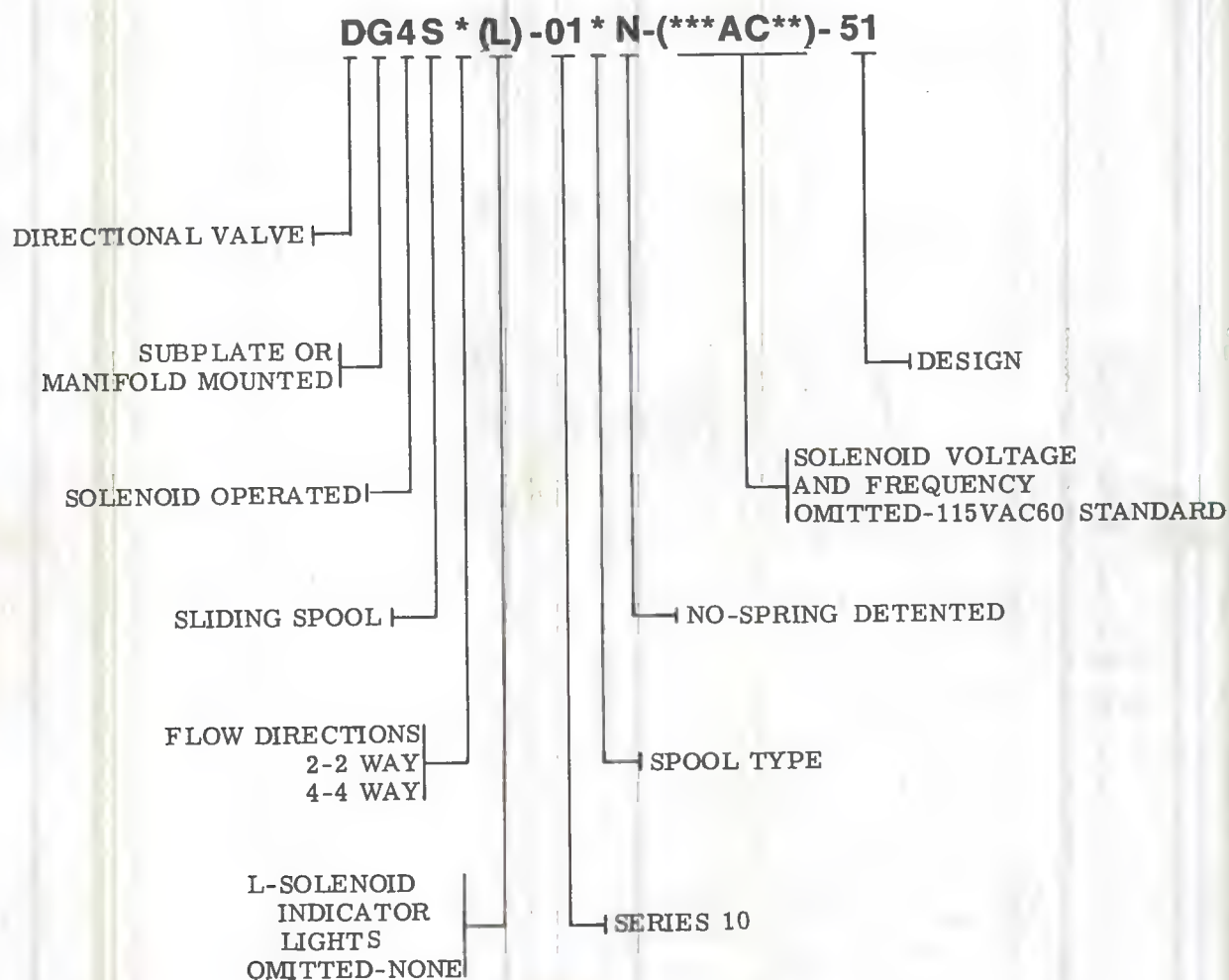
841

SOLENOID INDICATOR LIGHT KIT (INCLUDES ALL PARTS IDENTIFIED)	
VOLTAGE RANGE	KIT
100 thru 125	941615

FOR MODELS WITH
SOLENOID INDICATOR LIGHTS



MODEL CODE BREAKDOWN



For satisfactory service life of these components in industrial applications, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from Vickers OFP, OFR, and OFRS series are recommended.

Litho in U. S. A.

Service Parts Information

**SPRING
CENTERED
DIRECTIONAL
VALVES**

DG4S4-01*(*)C-(*)-50

DG4S2-012C-(*)-50

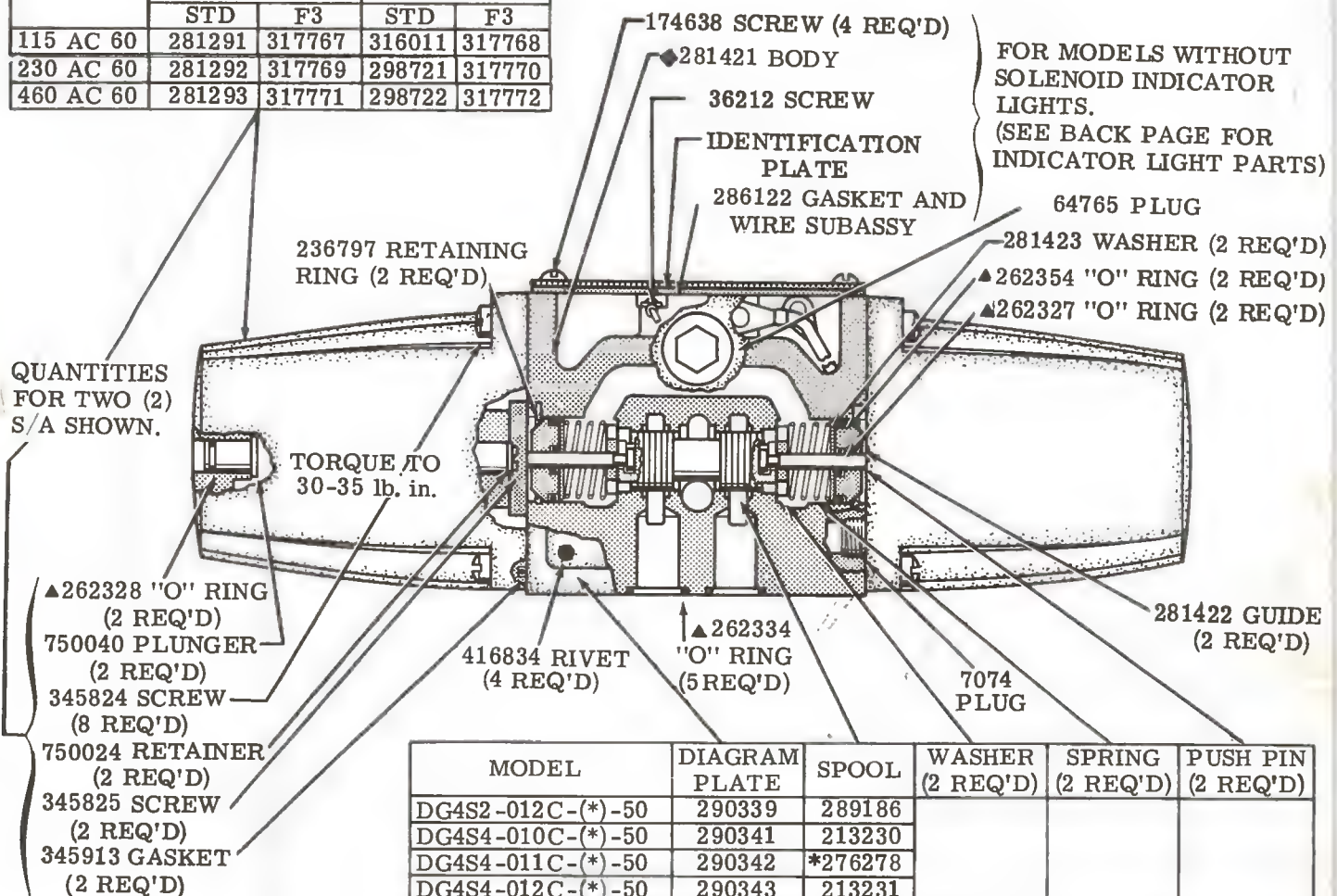
VICKERS

A TRIMONA COMPANY

NOTE
FOR 50/60 CYCLE SOLENOIDS
SEE BACK PAGE

FOR ADDITIONAL
SOLENOID S/A'S
SEE I-3544-S.

VOLTAGE	SOLENOID S/A (2 REQ'D)			
	S/A COMPLETE		COIL	
	STD	F3	STD	F3
115 AC 60	281291	317767	316011	317768
230 AC 60	281292	317769	298721	317770
460 AC 60	281293	317771	298722	317772



▲INCLUDED IN
919214 SEAL KIT

◆NOT AVAILABLE
FOR SALE

MODEL	DIAGRAM PLATE	SPOOL	WASHER (2 REQ'D)	SPRING (2 REQ'D)	PUSH PIN (2 REQ'D)
DG4S2-012C-(*)-50	290339	289186			
DG4S4-010C-(*)-50	290341	213230			
DG4S4-011C-(*)-50	290342	*276278			
DG4S4-012C-(*)-50	290343	213231			
DG4S4-013C-(*)-50	290344	*239903			
DG4S4-016C-(*)-50	290345	213232			
DG4S4-0168C-(*)-50	577480	213232			
DG4S4-017C-(*)-50	290346	236624			
DG4S4-0178C-(*)-50	577482	236624			
DG4S4-018C-(*)-50	290340	235637	□ 283637	217323	290264
DG4S4-0133C-(*)-50	577484	236615	211846	290072	213268

* ASSEMBLE RELIEVED LAND OF TYPE 1 & NARROW LAND OF TYPE 3 SPOOLS TOWARD "A" PORT.

□ ASSEMBLE ON SPOOL WITH SHARP BREAK EDGE TOWARD SPRING.

Vickers, Incorporated
P.O. Box 302
Troy, Michigan 48007-0302

Revised 7-1-86

I-3477-S

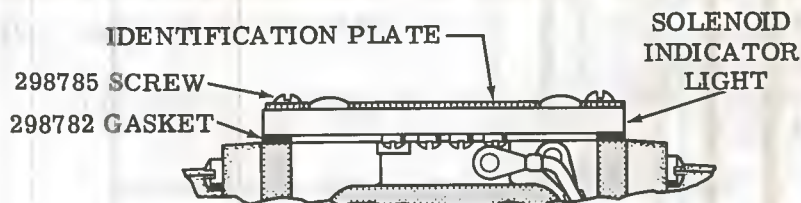
85

**SOLENOID INDICATOR LIGHT KIT
(INCLUDES ALL PARTS IDENTIFIED)**

VOLTAGE RANGE	KIT
100 thru 125	941615

NOTE
REFER TO PARTS DRAWING
I-3487-S FOR MODELS WITH
PLUG-IN FEATURE.

**FOR MODELS WITH
SOLENOID INDICATOR LIGHTS**

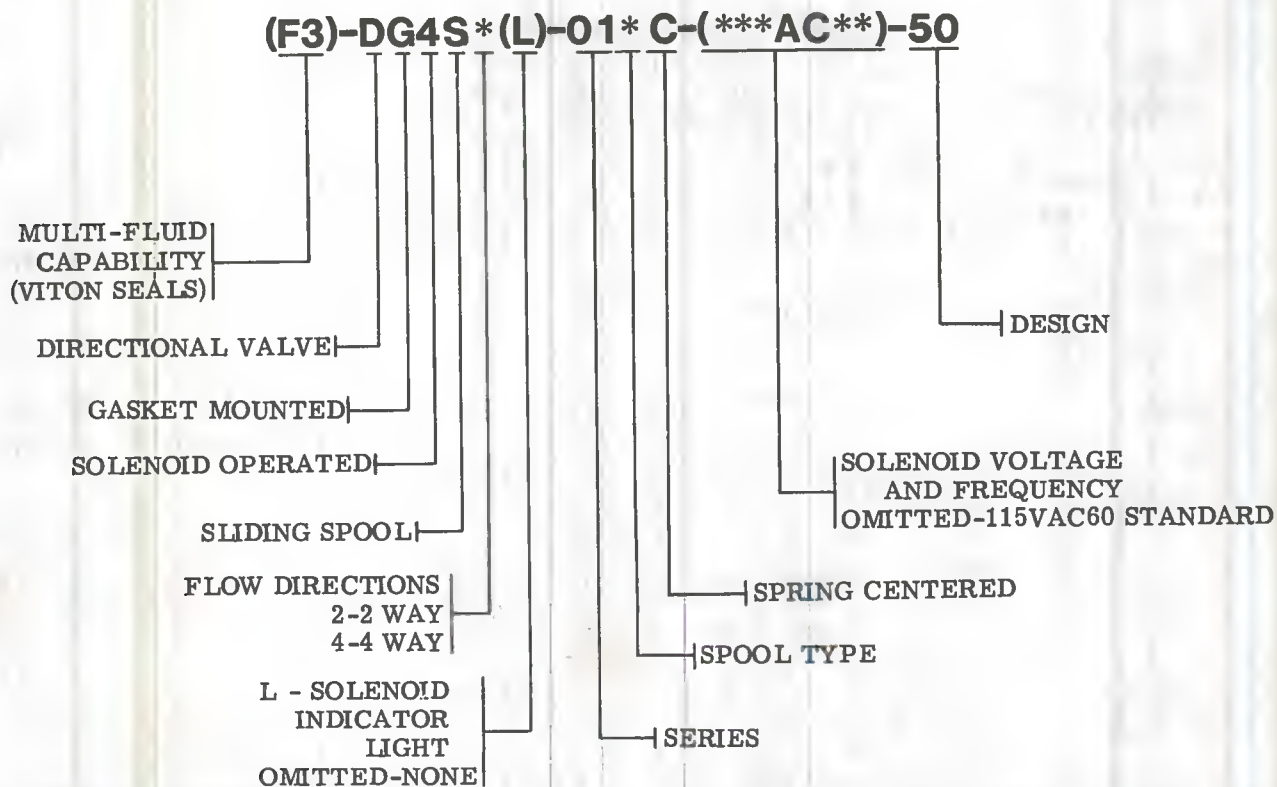


50/60 HERTZ SOLENOIDS		
MODEL	SOLENOID S/A (2 REQ'D)	COIL
DG*S4-****-115AC-50/60-5*	751137	751057
F3-DG*S4-****-115AC-50/60-5*	751407	751406

LEAD WIRE IDENTIFICATION
RED LEAD - COMMON
YELLOW LEAD - 60 Hz
BLUE LEAD - 50 Hz

CAUTION
FOR 50 CYCLE OPERATION USE RED AND BLUE LEADS
FOR 60 CYCLE OPERATION USE RED AND YELLOW LEADS
DO NOT USE BLUE AND YELLOW LEADS TOGETHER

MODEL CODE BREAKDOWN



For satisfactory service life of these components in industrial applications, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from Vickers OFFP, OFR, and OFRS series are recommended.

Litho in U. S. A.

Service Parts Information

SPRING OFFSET DIRECTIONAL VALVES

VICKERS®
A TRIMONA COMPANY

DG4S2(L)-012A-(***AC**)-50
DG4S4(L)-01*A-(***AC**)-50

NOTE
FOR 50/60 CYCLE SOLENOIDS
SEE BACK PAGE

RIGHT HAND ASSEMBLY SHOWN.
IN LEFT HAND ASSEMBLY ALL
PARTS OF VALVE EXCEPT BODY
ARE REVERSED. EXAMPLE OF
L. H. MODEL:
DG4S4(L)-012A-50-LH

VOLTAGE	SOLENOID S/A			
	S/A COMPLETE		COIL	
	STD	F3	STD	F3
115AC60	281291	317767	316011	317768
230AC60	281292	317769	298721	317770
460AC60	281293	317771	298722	317772

FOR ADDITIONAL
SOLENOID S/A'S
SEE I-3544-S.

213268 PUSH PIN
(LONGER THAN
220234)

INCLUDED
IN
SOLENOID

▲262328 "O" RING
750040 PLUNGER
750024 RETAINER
345825 SCREW
*345824 SCREW
(4 REQ'D)
345913 GASKET
416834 RIVET
(4 REQ'D)

281423 WASHER
▲262327 "O" RING
281422 GUIDE

174638 SCREW
(4 REQ'D)

IDENTIFICATION
PLATE

286122 WIRE &
GASKET S/A

36212 SCREW

FOR MODELS WITHOUT
SOLENOID INDICATOR
LIGHT.
(SEE BACK PAGE FOR
INDICATOR LIGHT PARTS)

64765 PLUG

185645 SCREW
(4 REQ'D)

236451 SPRING

▲281545 GASKET

236797 RETAINING
RING (2 REQ'D)

▲262354 "O" RING
(2 REQ'D)

287968 COVER

7074
PLUG

281547
SPACER

237976 SPRING

◆281421 BODY

▲262334 "O" RING (5 REQ'D)

MODEL	DIAGRAM PLATE	
	RH	LH
DG4S2(L)-	290347	577488
DG4S4(L)-	290348	577490

MODEL	SPOOL	PUSH PIN	LIMITER (2 REQ'D)	GUIDE	"O" RING
DG4S2(L)-012A-(*)-50	220344	—	—	281424	—
DG4S4(L)-010A-(*)-50	213230	—	—	—	—
DG4S4(L)-012A-(*)-50	213231	220234	294226	284931	262327
DG4S4(L)-016A-(*)-50	213232	—	—	—	▲

▲INCLUDED IN F3
SEAL KIT 919214

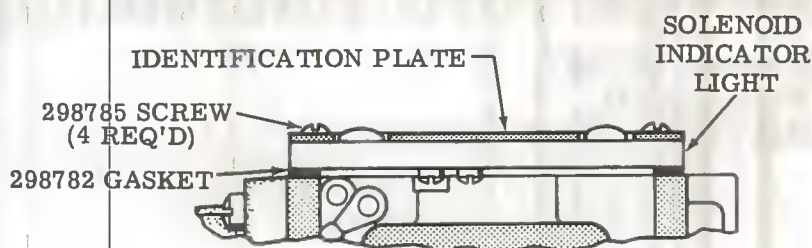
◆NOT AVAILABLE
FOR SALE

*TORQUE TO
30 - 35 lb. in.

SOLENOID INDICATOR LIGHT KITS (INCLUDES ALL PARTS IDENTIFIED)	
VOLTAGE RANGE	KIT
100 thru 125	941615

NOTE
REFER TO PARTS DRAWING
I-3487-S FOR MODELS WITH
PLUG-IN FEATURE.

FOR MODELS WITH
SOLENOID INDICATOR LIGHT



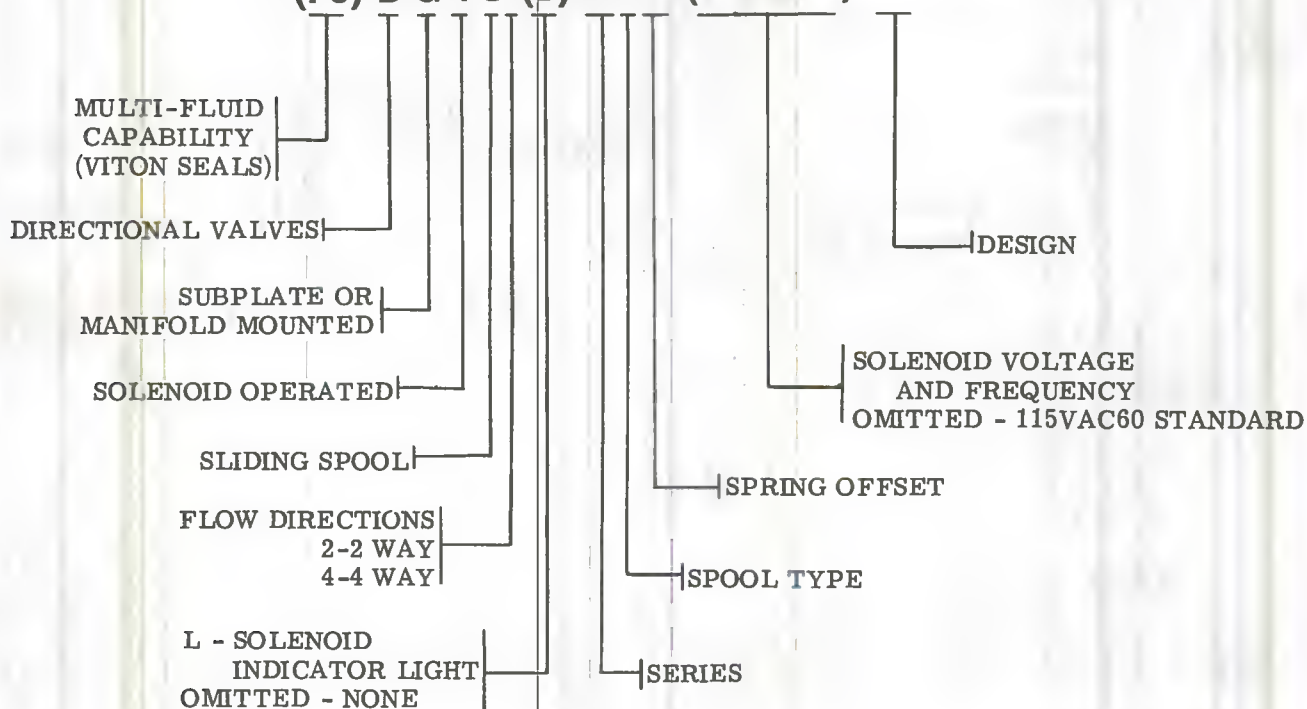
50/60 HERTZ SOLENOIDS		
MODEL	SOLENOID S/A	COIL
DG*S4-****-115AC-50/60-50	751137	751057
F3-DG*S4-****-115AC-50/60-50	751407	751406

LEAD WIRE IDENTIFICATION
RED LEAD - COMMON
YELLOW LEAD - 60 Hz.
BLUE LEAD - 50 Hz.

CAUTION
FOR 50 CYCLE OPERATION USE RED AND BLUE LEADS
FOR 60 CYCLE OPERATION USE RED AND YELLOW LEADS
DO NOT USE BLUE AND YELLOW LEADS TOGETHER

MODEL CODE BREAKDOWN

(F3)-D G 4 S*(L)-01*A-(AC**)-50**



For satisfactory service life of these components in industrial applications, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from Vickers OFP, OFR, and OFRS series are recommended.

Litho in U. S. A.

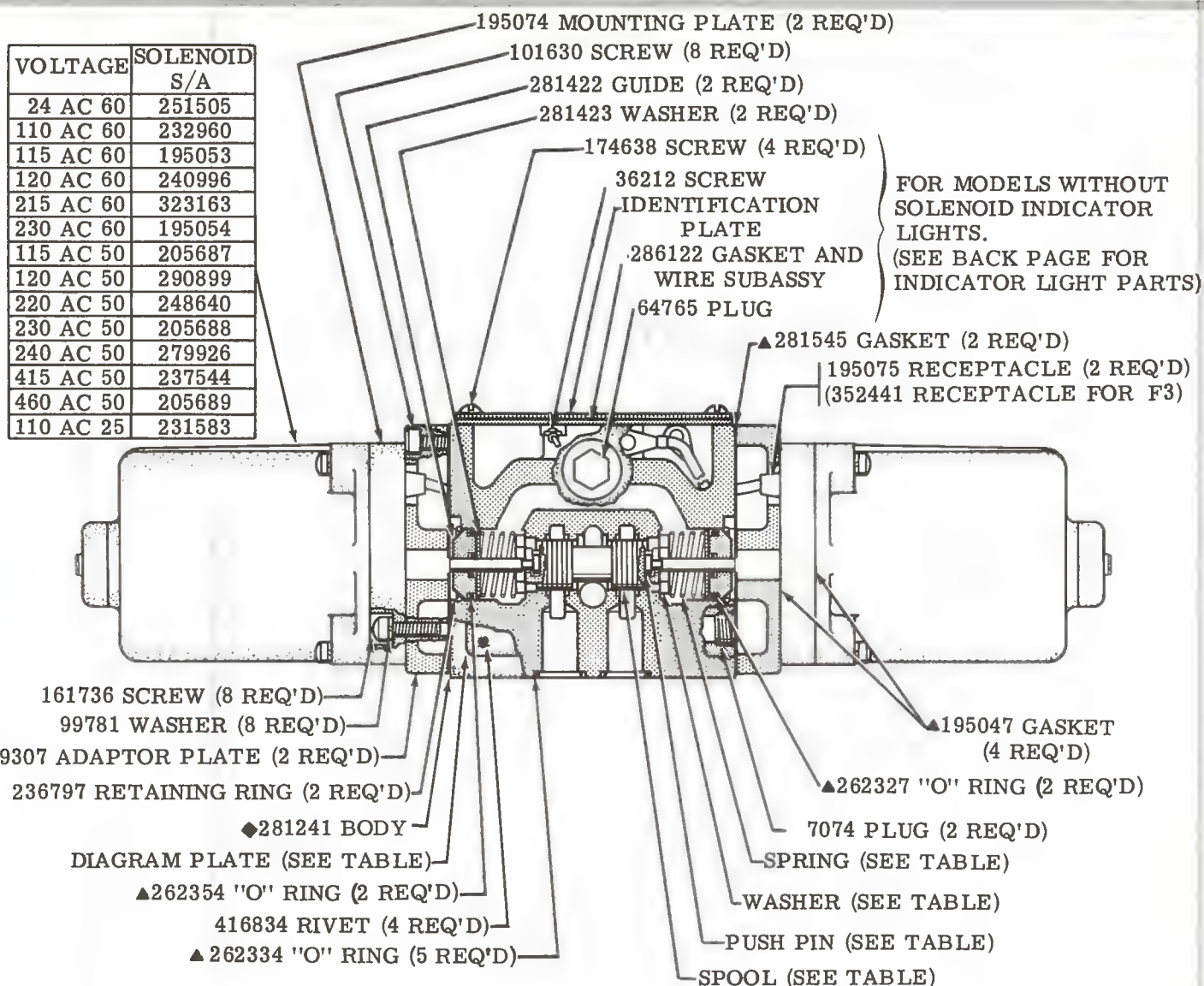
Service Parts Information

VICKERS

A TRIMONA COMPANY

SPRING CENTERED SOLENOID CONTROLLED DIRECTIONAL VALVES

DG4S4(L)-01 *C-H- (**AC**) -50



◆NOT AVAILABLE
FOR SALE

▲INCLUDED IN F3
919359 SEAL KIT

*ASSEMBLE ON SPOOL WITH
SHARP BREAK EDGE OF
WASHER TOWARD SPRING

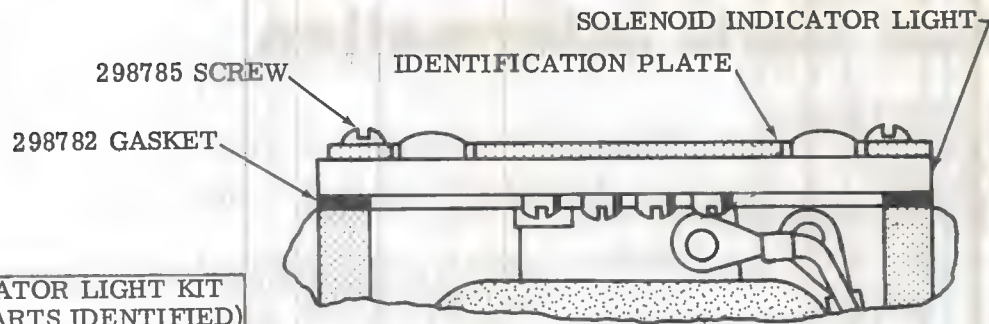
MODEL	DIAGRAM PLATE	SPOOL	WASHER (2 REQ'D)	SPRING (2 REQ'D)	PUSH PIN (2 REQ'D)
DG4S4-010C-H-(*)-50	290341	213230	211846	290072	289340
DG4S4-012C-H-(*)-50	290343	213231	211846	290072	289340
DG4S4-013C-H-(*)-50	290344	239903	211846	290072	289340
DG4S4-016C-H-(*)-50	290345	213232	211846	290072	289340
DG4S4-017C-H-(*)-50	290346	236624	211846	290072	289340
DG4S4-018C-H-(*)-50	290340	235637	*283637	217323	290320
DG4S4-0133C-H-(*)-50	577484	236615	211846	290072	289340

Vickers, Incorporated
P.O. Box 302
Troy, Michigan 48007-0302

Revised 7-1-86

I-3483-S

87

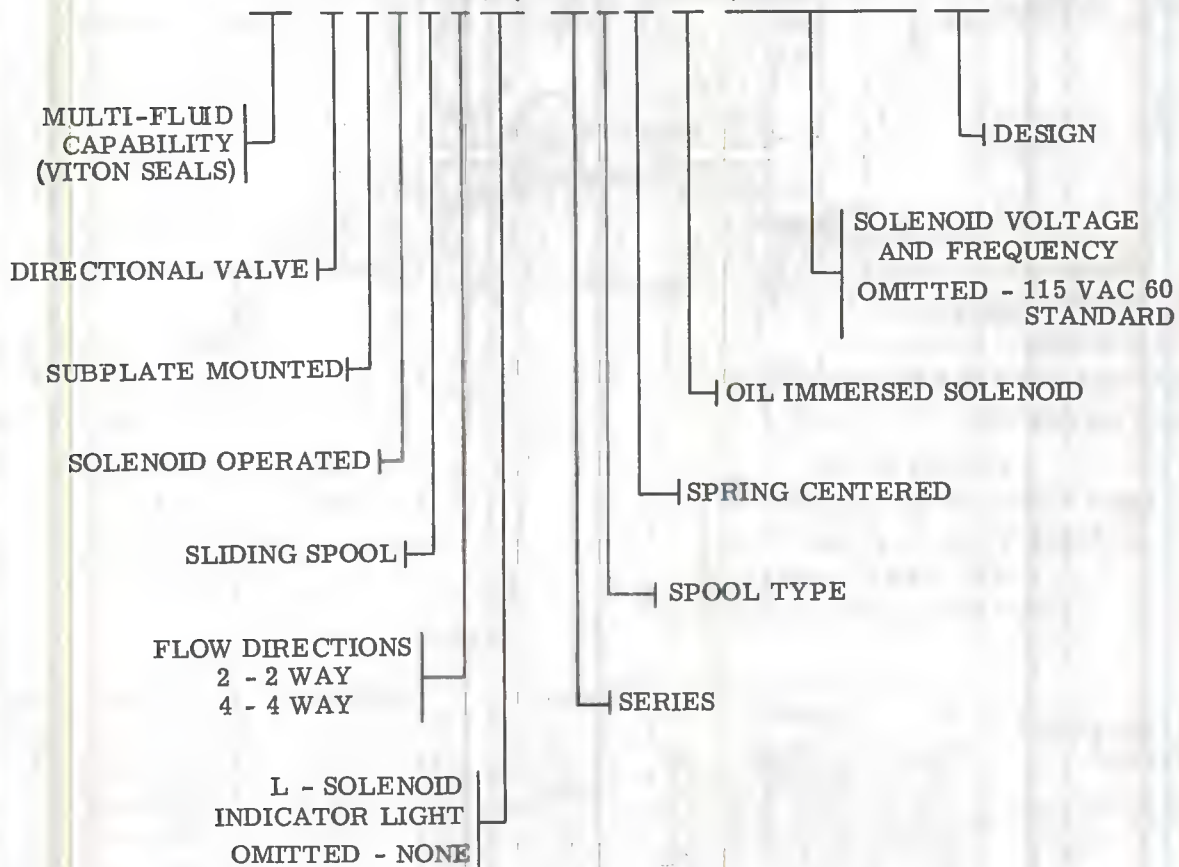


SOLENOID INDICATOR LIGHT KIT (INCLUDES ALL PARTS IDENTIFIED)	
VOLTAGE RANGE	KIT
100 thru 125	941615

NOTE
REFER TO PARTS DRAWING I-3487-S FOR
MODELS WITH PLUG-IN FEATURE.

MODEL CODE BREAKDOWN

F3-DG4S*(L)-01*C-H-(AC**)-50**



For satisfactory service life of these components in industrial applications, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from Vickers OFF, OFR, and OFRS series are recommended.

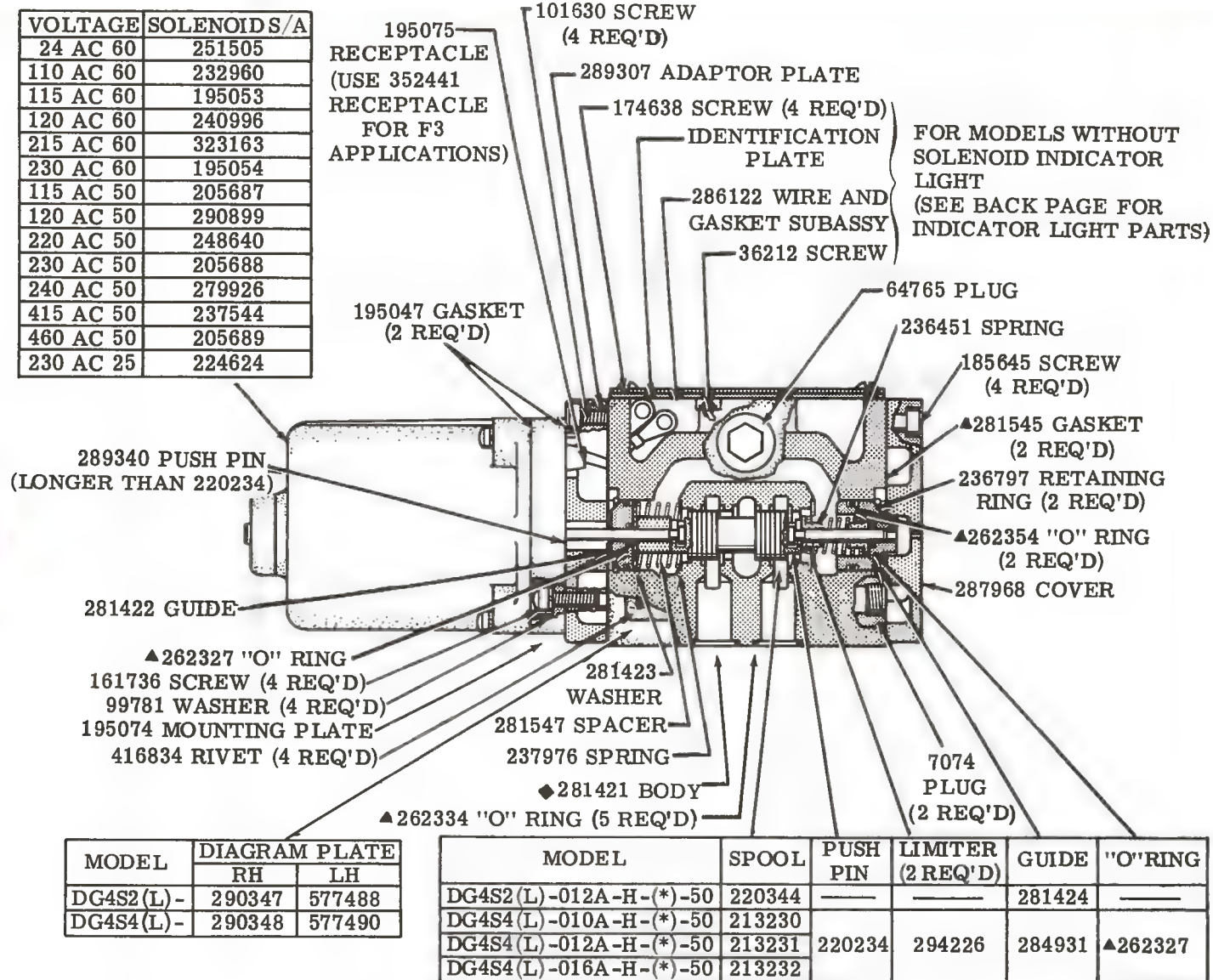
Litho in U. S. A.

Service Parts Information

VICKERS
A TRIMONA COMPANY

SPRING OFFSET SOLENOID CONTROLLED DIRECTIONAL VALVES

DG4S*(L)-01*-A-H-(***AC*)-50

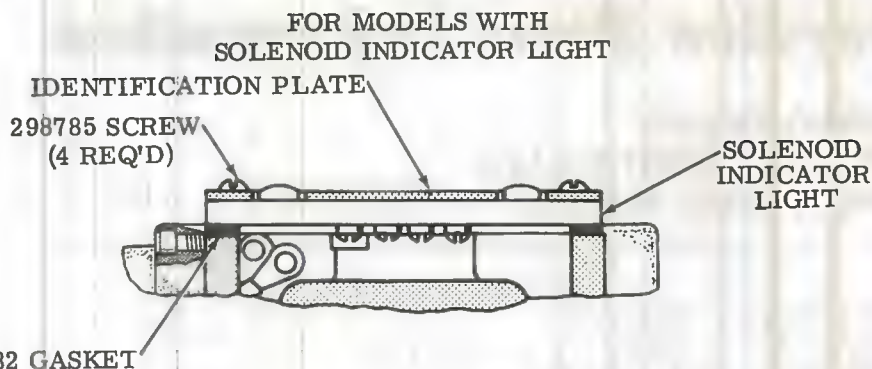


RIGHT HAND ASSEMBLY SHOWN. IN LEFT HAND ASSEMBLY ALL PARTS OF VALVE EXCEPT BODY ARE REVERSED. EXAMPLE OF L.H. MODEL: DG4S4-012A-H-50-LH

▲INCLUDED IN F3 SEAL KIT 919359

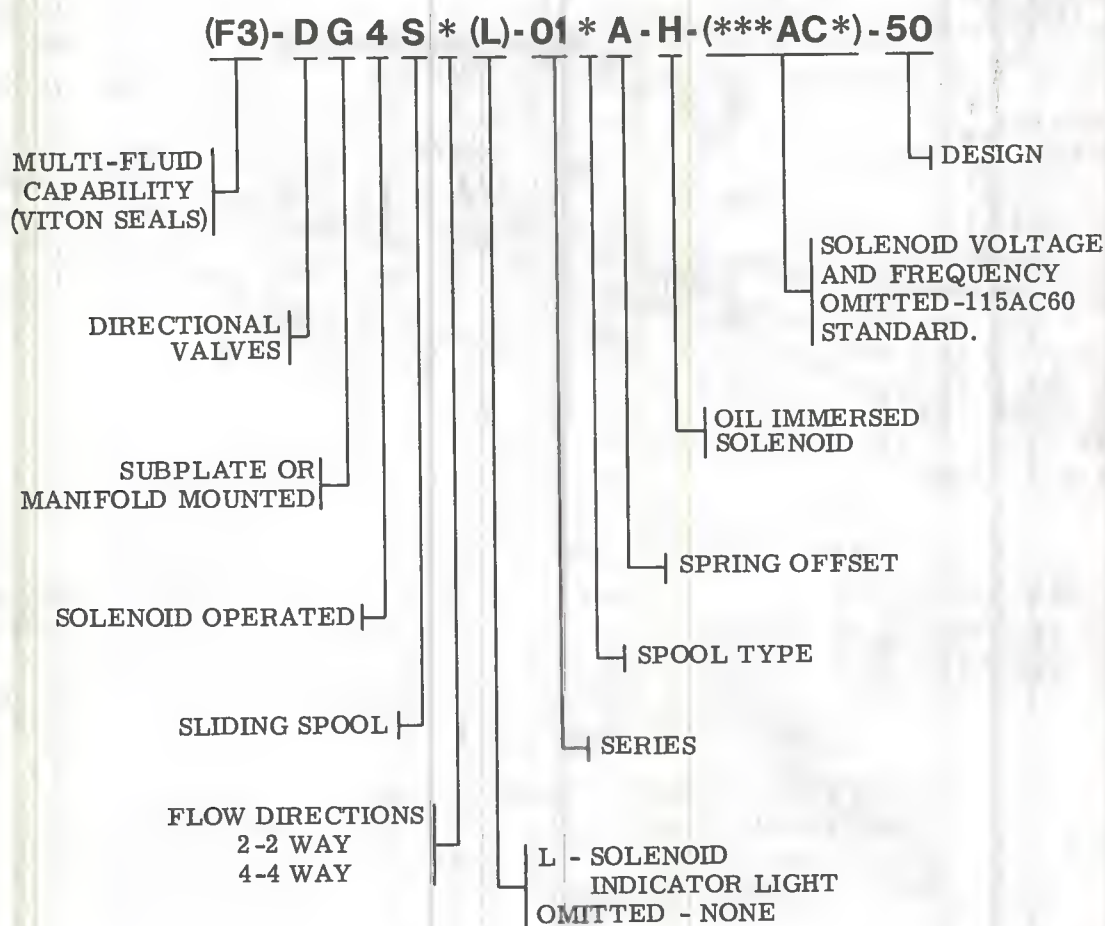
◆NOT AVAILABLE FOR SALE

SOLENOID INDICATOR LIGHT KIT (INCLUDES ALL PARTS IDENTIFIED)	
VOLTAGE RANGE	KIT
100 thru 125	941615



NOTE
REFER TO PARTS DRAWING
I-3487-S FOR MODELS WITH
PLUG-IN FEATURE.

MODEL CODE BREAKDOWN



For satisfactory service life of these components, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from Vickers OFP, OFR, and OFRS series are recommended.

Service Parts Information

DIRECTIONAL VALVE WITH LIMIT SWITCH

SDG4S*(L)-01*A-50

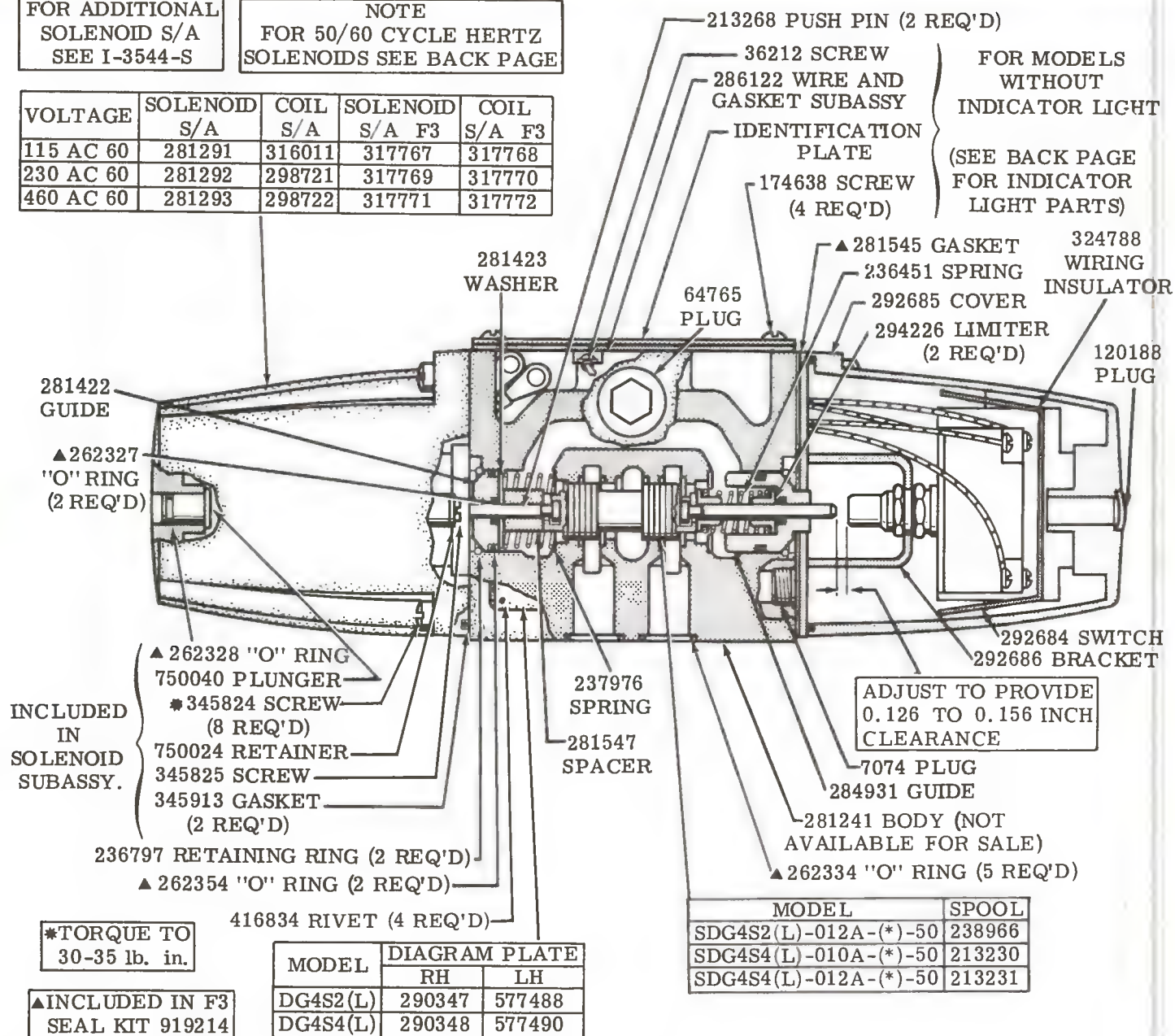
VICKERS

A TRIMONA COMPANY

FOR ADDITIONAL
SOLENOID S/A
SEE I-3544-S

NOTE
FOR 50/60 CYCLE HERTZ
SOLENOIDS SEE BACK PAGE

VOLTAGE	SOLENOID S/A	COIL S/A	SOLENOID S/A F3	COIL S/A F3
115 AC 60	281291	316011	317767	317768
230 AC 60	281292	298721	317769	317770
460 AC 60	281293	298722	317771	317772



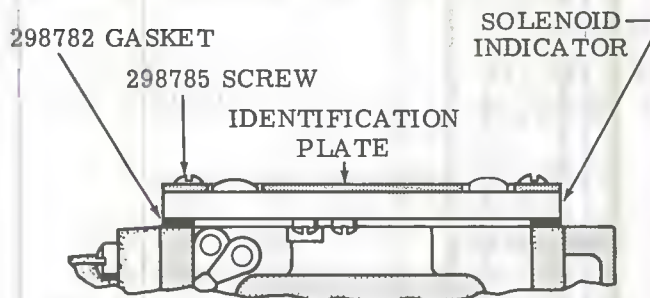
RIGHT HAND ASSEMBLY SHOWN. IN LEFT HAND ASSEMBLY ALL PARTS OF VALVE EXCEPT BODY ARE REVERSED. EXAMPLE OF L.H. MODEL: SDG4S2*-012A-50-LH



SOLENOID INDICATOR LIGHT KIT (INCLUDES ALL PARTS IDENTIFIED)	
VOLTAGE RANGE	KIT
100 thru 125	941615

NOTE
REFER TO PARTS DRAWING
I-3487-S FOR MODELS WITH
PLUG-IN FEATURE.

FOR MODELS WITH
SOLENOID INDICATOR LIGHT

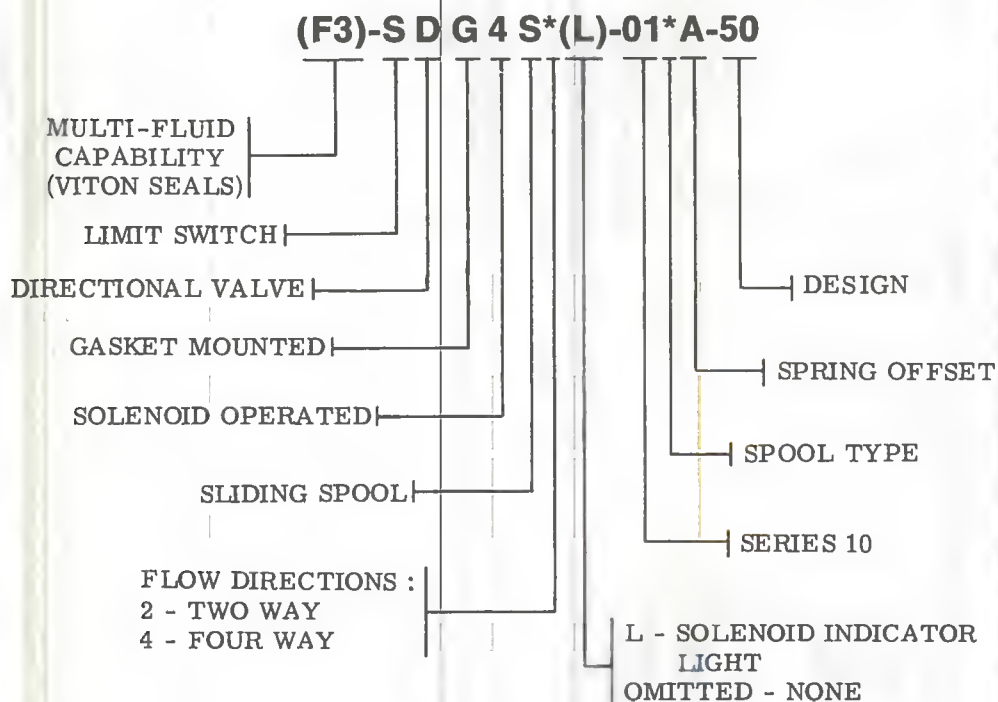


50/60 HERTZ SOLENOIDS		
MODEL	SOLENOID S/A	COIL
SDG*S4-****-115AC-50/60-50	751137	751057
F3-SDG*S4-****-115AC-50/60-50	751407	751406

LEAD WIRE IDENTIFICATION
RED LEAD - COMMON
YELLOW LEAD - 60 Hz.
BLUE LEAD - 50 Hz.

CAUTION
FOR 50 CYCLE OPERATION USE RED AND BLUE LEADS
FOR 60 CYCLE OPERATION USE RED AND YELLOW LEADS
DO NOT USE BLUE AND YELLOW LEADS TOGETHER.

MODEL CODE BREAKDOWN



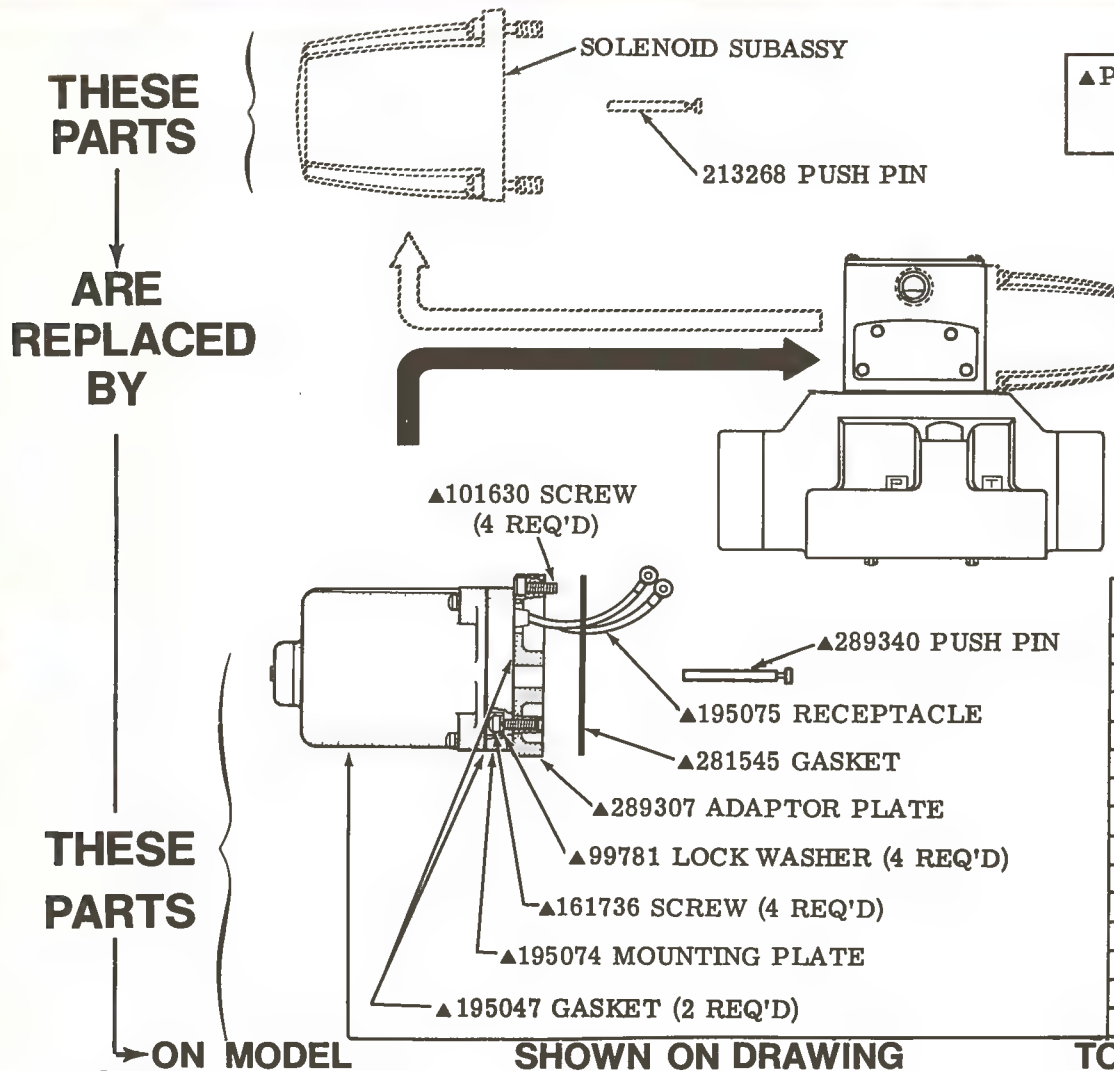
For satisfactory service life of these components, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from Vickers OFP, OFR, and OFRS series are recommended.

Litho in U. S. A.

Service Parts Information



DIRECTIONAL VALVES WITH OIL IMMERSED SOLENOIDS



▲ PARTS INCLUDED
IN 941769
ADAPTER KIT

THE SAME
CHANGE
APPLIES TO
THIS END
FOR MODELS
WITH TWO
SOLENOIDS

SOLENOID S/A	VOLTAGE
251505	24 AC 60
232960	110 AC 60
195053	115 AC 60
240996	120 AC 60
323163	215 AC 60
195054	230 AC 60
205687	115 AC 50
290899	120 AC 50
248640	220 AC 50
205688	230 AC 50
279926	240 AC 50
237544	415 AC 50
205689	460 AC 50
231583	110 AC 25

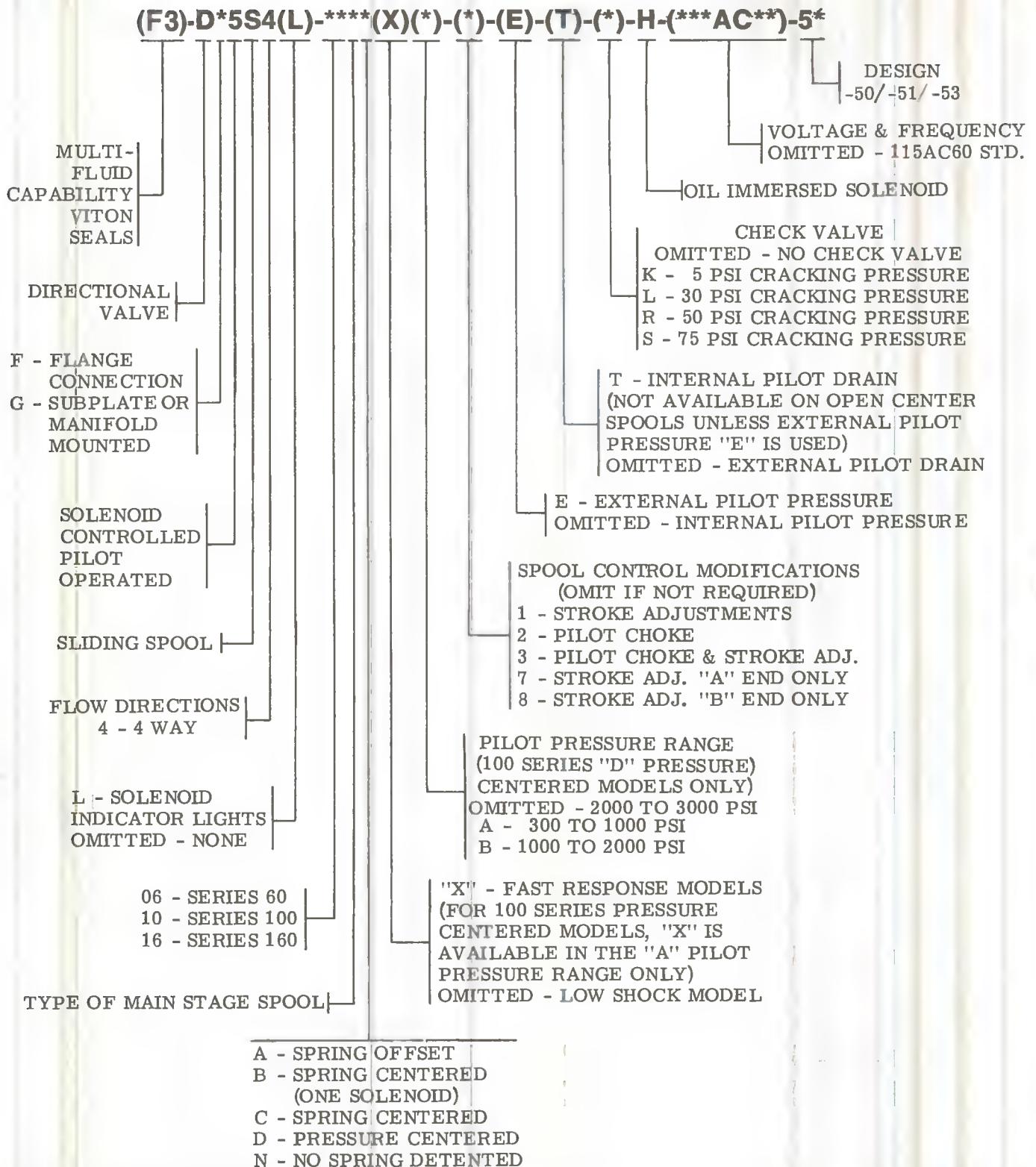
ON MODEL SHOWN ON DRAWING

TO MAKE MODEL

	-50 DESIGN	-51 DESIGN	-53 DESIGN
DF5S4(L)-16*A-50/53	I-3486-S		I-3622-S
DF5S4(L)-16*B-53			I-3622-S
DF5S4(L)-16*C-50/51/53	I-3482-S		I-3622-S
DF5S4(L)-16*N-50/51/53	I-3482-S	I-3482-S	I-3622-S
DG5S4(L)-06*A-50/51	I-3492-S	I-3502-S	
DG5S4(L)-06*C-50/51	I-3490-S	I-3473-S	
DG5S4(L)-06*D-50/51	I-3493-S	I-3504-S	
DG5S4(L)-06*N-50/51	I-3491-S	I-3474-S	
DG5S4(L)-10*A-50/51/53	I-3496-S	I-3513-S	I-3624-S
DG5S4(L)-10*B-53			I-3624-S
DG5S4(L)-10*C-50/51/53	I-3494-S	I-3509-S	I-3624-S
DG5S4(L)-10*D-50/51/53	I-3497-S	I-3514-S	I-3625-S
DG5S4(L)-10*N-50/51/53	I-3495-S	I-3512-S	I-3624-S

DF5S4(L)-16*A-H-50/53
DF5S4(L)-16*B-H-53
DF5S4(L)-16*C-H-50/51/53
DG5S4(L)-16*N-H-50/51/53
DG5S4(L)-06*A-H-50/51
DG5S4(L)-06*C-H-50/51
DG5S4(L)-06*D-H-50/51
DG5S4(L)-06*N-H-50/51
DG5S4(L)-10*A-H-50/51/53
DG5S4(L)-10*B-H-53
DG5S4(L)-10*C-H-50/51/53
DG5S4(L)-10*D-H-50/51/53
DG5S4(L)-10*N-H-50/51/53

MODEL CODE BREAKDOWN



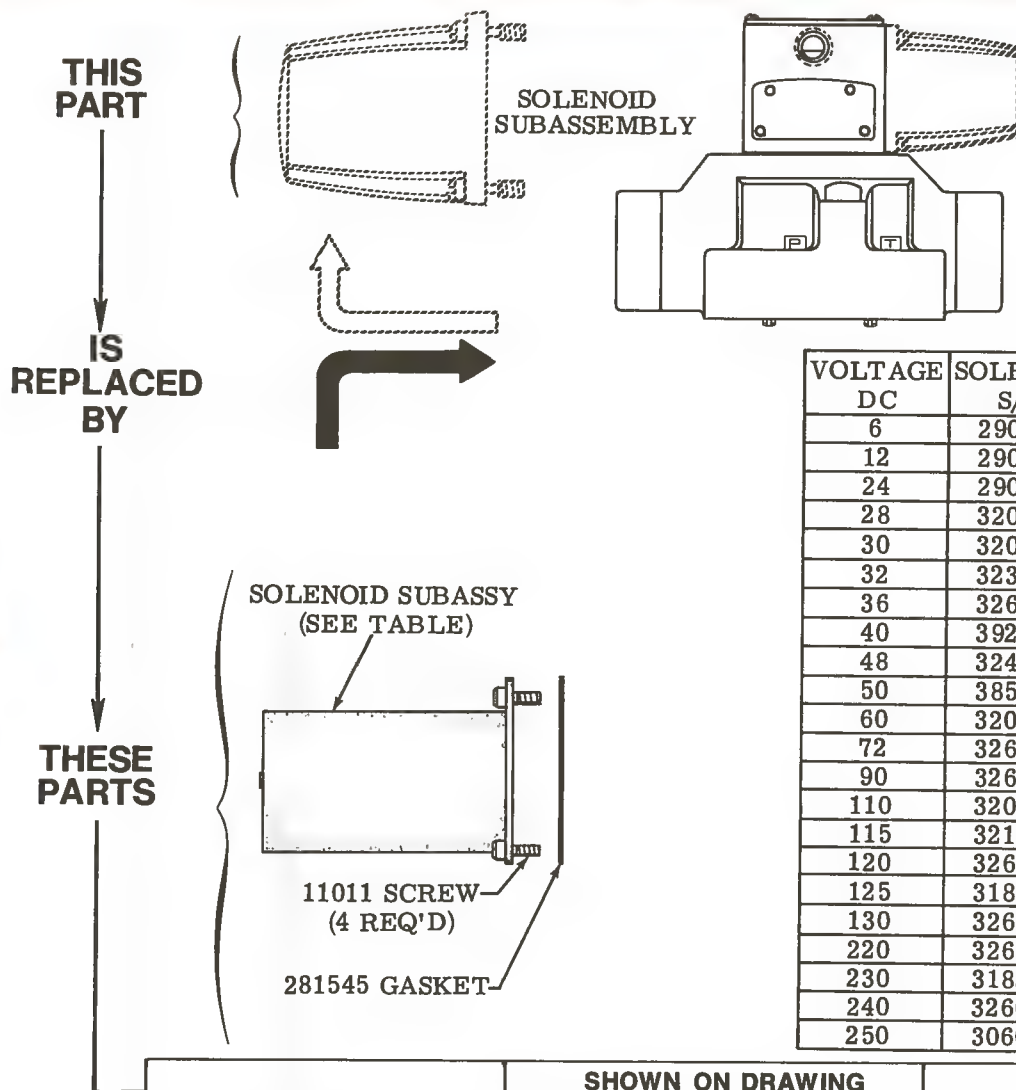
For satisfactory service life of these components, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from Vickers OFP, OFR, and OFRS series are recommended.

Litho in U. S. A.

Service Parts Information

DIRECTIONAL VALVES WITH DIRECT CURRENT SOLENOIDS

VICKERS®
A TRIMOVA COMPANY



THE SAME
CHANGE
APPLIES TO
THIS END
FOR MODELS
WITH TWO
SOLENOIDS

VOLTAGE DC	SOLENOID S/A	COIL	F3 S/A SOLENOID	F3 COIL
6	290838	291582		
12	290839	291583	751283	751284
24	290840	291584	393091	393090
28	320223	320224		
30	320227	320228		
32	323224	323225		
36	326039	326311		
40	392502	392503		
48	324739	324740	585214	585215
50	385683	385684		
60	320641	320642		
72	326043	326315		
90	326038	326310		
110	320218	320219	750463	750464
115	321986	321987		
120	326041	326313		
125	318717	318718	751264	751265
130	326042	326314		
220	326040	326312	751270	751276
230	318392	318393	751266	751267
240	326044	326316	751268	751269
250	306083	306084	751272	751273

ON MODEL	SHOWN ON DRAWING			TO MAKE MODEL
	-50	-51	-53/-54	
DF5S4-16*A-50/53	I-3486-S		I-3622-S	DF5S4-16*A-*DC-50/53
DF5S4-16*B-53				DF5S4-16*B-*DC-53
DF5S4-16*C-50/53				DF5S4-16*C-*DC-50/53
DF5S4-16*N-50/51/53	I-3482-S	I-3482-S		DF5S4-16*N-*DC-50/51/53
DG5S4-06*A-50/51	I-3492-S	I-3502-S	I-3624-S	DG5S4-16*A-*DC-50/51
DG5S4-06*C-50/51	I-3490-S	I-3473-S		DG5S4-06*C-*DC-50/51
DG5S4-06*D-50/51	I-3493-S	I-3504-S		DG5S4-06*D-*DC-50/51
DG5S4-06*N-50/51	I-3491-S	I-3474-S		DG5S4-06*N-*DC-50/51
DG5S4-10*A-50/51/53/54	I-3496-S	I-3513-S	I-3625-S	DG5S4-10*A-*DC-50/51/53/54
DG5S4-10*B-53/54				DG5S4-10*B-*DC-53/54
DG5S4-10*C-50/51/53/54	I-3494-S	I-3509-S		DG5S4-10*C-*DC-50/51/53/54
DG5S4-10*D-50/51/53/54	I-3497-S	I-3514-S		DG5S4-10*D-*DC-50/51/53/54
DG5S4-10*N-50/51/53/54	I-3495-S	I-3512-S	I-3624-S	DG5S4-10*N-*DC-50/51/53/54

MODEL CODE BREAKDOWN

D*5 S 4(L)- ** *(X)(*)-(*)-(E)-(T)-(*)-*DC- 5*

DIRECTIONAL
VALVE

DESIGN
-50/-51/-53/-54

F - FLANGE
CONNECTION
G - SUBPLATE OR
MANIFOLD MOUNTED

SOLENOID VOLTAGE

SOLENOID
CONTROLLED
PILOT
OPERATED

DC SOLENOID

SLIDING SPOOL

CHECK VALVE
OMITTED-NO CHECK VALVE
K- 5 PSI CRACKING PRESSURE
L-30 PSI CRACKING PRESSURE
R-50 PSI CRACKING PRESSURE
S-75 PSI CRACKING PRESSURE

FLOW DIRECTIONS
4 - 4 WAY

T - INTERNAL PILOT DRAIN
(NOT AVAILABLE ON OPEN CENTER
SPOOLS UNLESS EXTERNAL PILOT
PRESSURE (E) IS USED)
OMITTED-EXTERNAL PILOT DRAIN

L - SOLENOID
INDICATOR LIGHTS
OMITTED - NONE

E - EXTERNAL PILOT PRESSURE
OMITTED-INTERNAL PILOT PRESSURE

06 - SERIES 60
10 - SERIES 100
16 - SERIES 160

TYPE OF MAIN STAGE SPOOL

SPOOL CONTROL MODIFICATIONS
(OMIT IF NOT REQUIRED)

A - SPRING OFFSET
C - SPRING CENTERED
D - PRESSURE CENTERED
N - NO-SPRING DETENTED

1 - STROKE ADJUSTMENTS
2 - PILOT CHOKE
3 - PILOT CHOKE AND STROKE ADJUSTMENT
7 - STROKE ADJUSTMENT "A" END ONLY
8 - STROKE ADJUSTMENT "B" END ONLY

"X" - FAST RESPONSE MODELS (FOR
100 SERIES PRESSURE CENTERED
MODELS, "X" IS AVAILABLE IN THE
"A" PILOT PRESSURE RANGE ONLY)
OMITTED - LOW SHOCK MODEL

PILOT PRESSURE RANGE
(100 SERIES PRESSURE
CENTERED MODELS ONLY)
A - 300 TO 1000 PSI
B - 1000 TO 2000 PSI

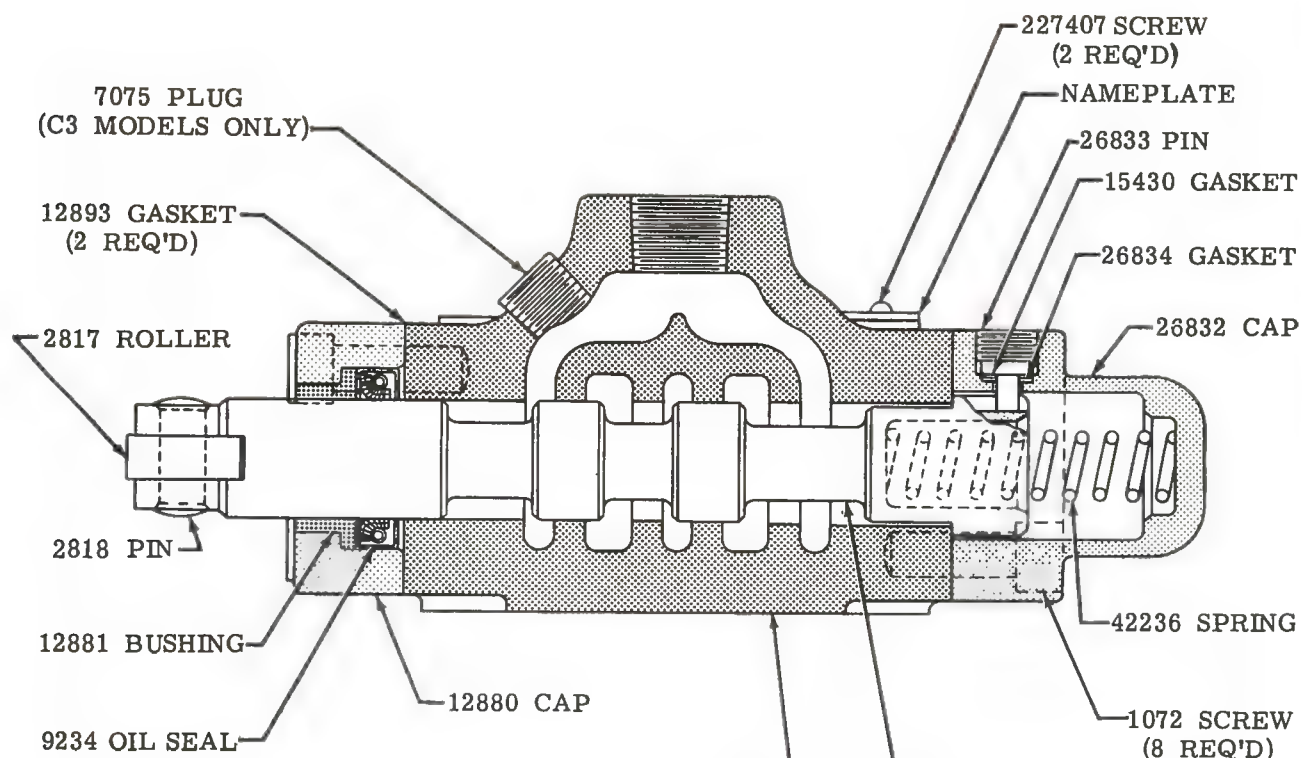
For satisfactory service life of these components in industrial applications, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from Vickers OFP, OFR, and OFRS series are recommended.

Litho in U. S. A.

Service Parts Information

VICKERS
A TRIZOVA COMPANY

ROLLER OPERATED DIRECTIONAL VALVES



MODEL NO.	PORT SIZE	BODY	SPOOL
C2-476-EA	$\frac{3}{8}$	10200	29948
C2-478-EA			29946
C2-478-EA-S1			63570
C3-430-EA	$\frac{3}{4}$	298-X	29940
C3-430-EA-S1			60524
C3-430-EA-S2			44450
C3-432-EA			29941
C3-432-EA-S4			30850

For satisfactory service life of these components, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from OFF, OFR and OFRS filter series are recommended.

Vickers, Incorporated
1401 Crooks Road
Troy, Michigan 48064

Revised 1-1-88

I-975-S



Service Parts Information

VICKERS

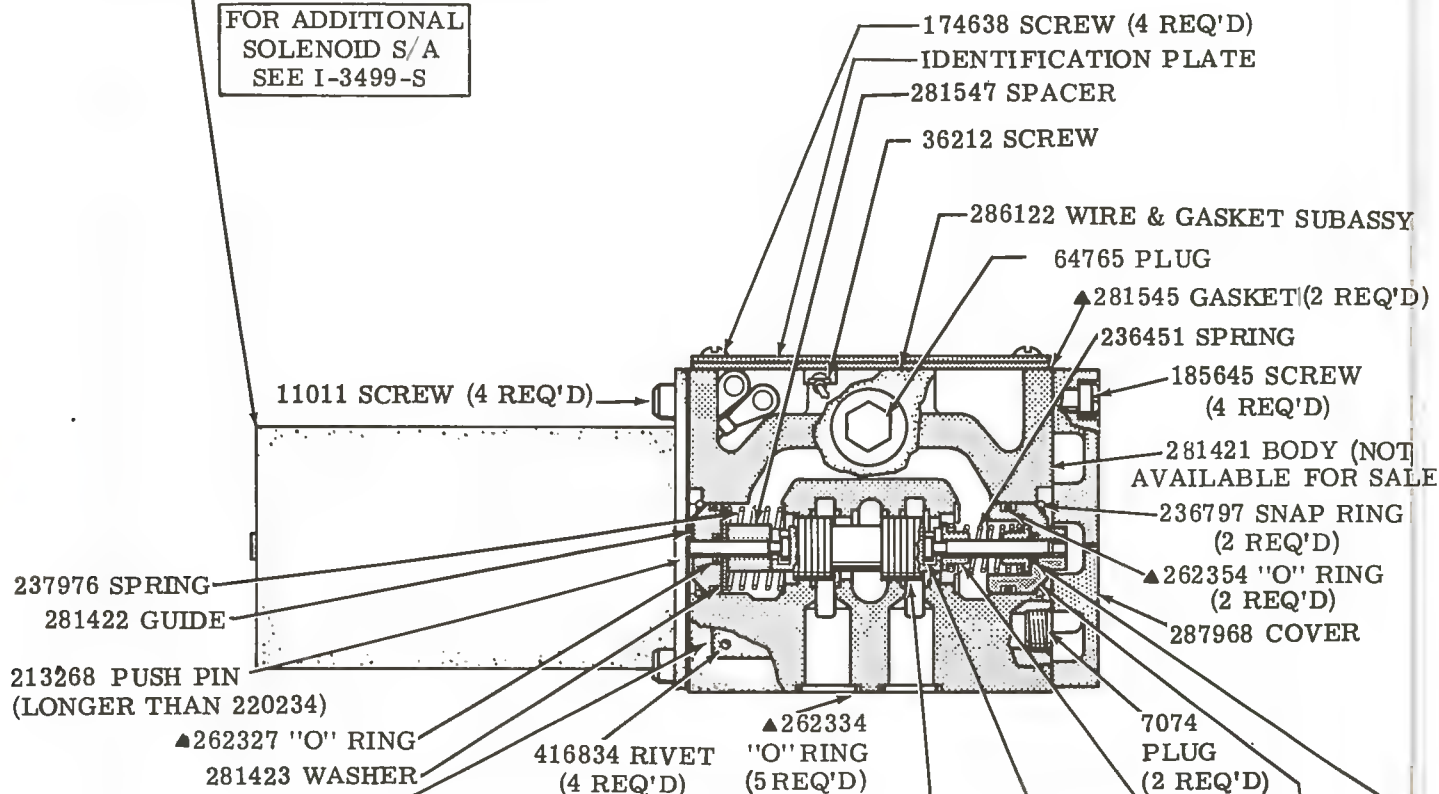
A TRIMONA COMPANY

**SPRING OFFSET
SOLENOID CONTROLLED
DIRECTIONAL VALVES**

DG4S2-012A-*DC-50
DG4S4-01*A-*DC-50

VOLTAGE DC	SOLENOID S/A (2 REQ'D)	COIL S/A (2 REQ'D)	SOLENOID S/A F3 (2 REQ'D)	COIL S/A F3 (2 REQ'D)
12	290839	291583	751283	751284
24	290840	291584	393091	393090

FOR ADDITIONAL
SOLENOID S/A
SEE I-3499-S



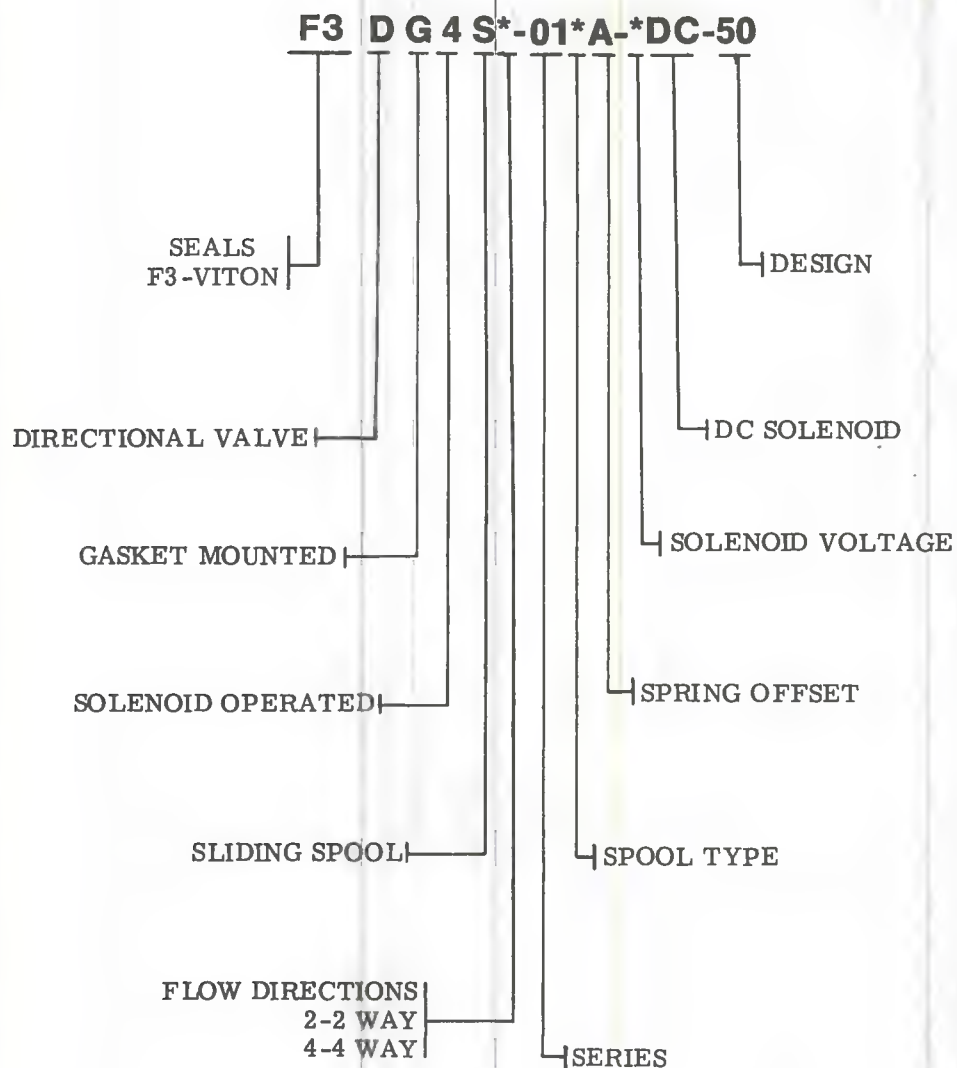
MODEL	DIAGRAM PLATE	
	RH	LH
DG4S2(L)-	290347	577488
DG4S4(L)-	290348	577490

MODEL	SPOOL	PUSH PIN	LIMITER (2 REQ'D)	GUIDE	"O" RING
DG4S2-012A-*DC-50	220344	—	—	281424	—
DG4S4-010A-*DC-50	213230	—	—	—	—
DG4S4-012A-*DC-50	213231	220234	294226	284931	262327
DG4S4-016A-*DC-50	213232	—	—	—	—

RIGHT HAND ASSEMBLY SHOWN.
IN LEFT HAND ASSEMBLY ALL
PARTS OF VALVE EXCEPT BODY
ARE REVERSED. EXAMPLE OF
L. H. MODEL:
DG4S4-012A-*DC-50-LH

▲ INCLUDED IN F3
SEAL KIT 919359

MODEL CODE BREAKDOWN



For satisfactory service life of these components, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from Vickers OFFP, OFR, and OFRS series are recommended.

Litho in U. S. A.

109

Service Parts Information

Pilot Operated
Directional Valve

DG3S4-04*(*)-(*)-40



Vickers, Incorporated

P.O. Box 302
Troy, Michigan 48007-0302

Revised 12-1-85

I-3549-S

SPRING CENTERED MODEL & NO-SPRING MODEL

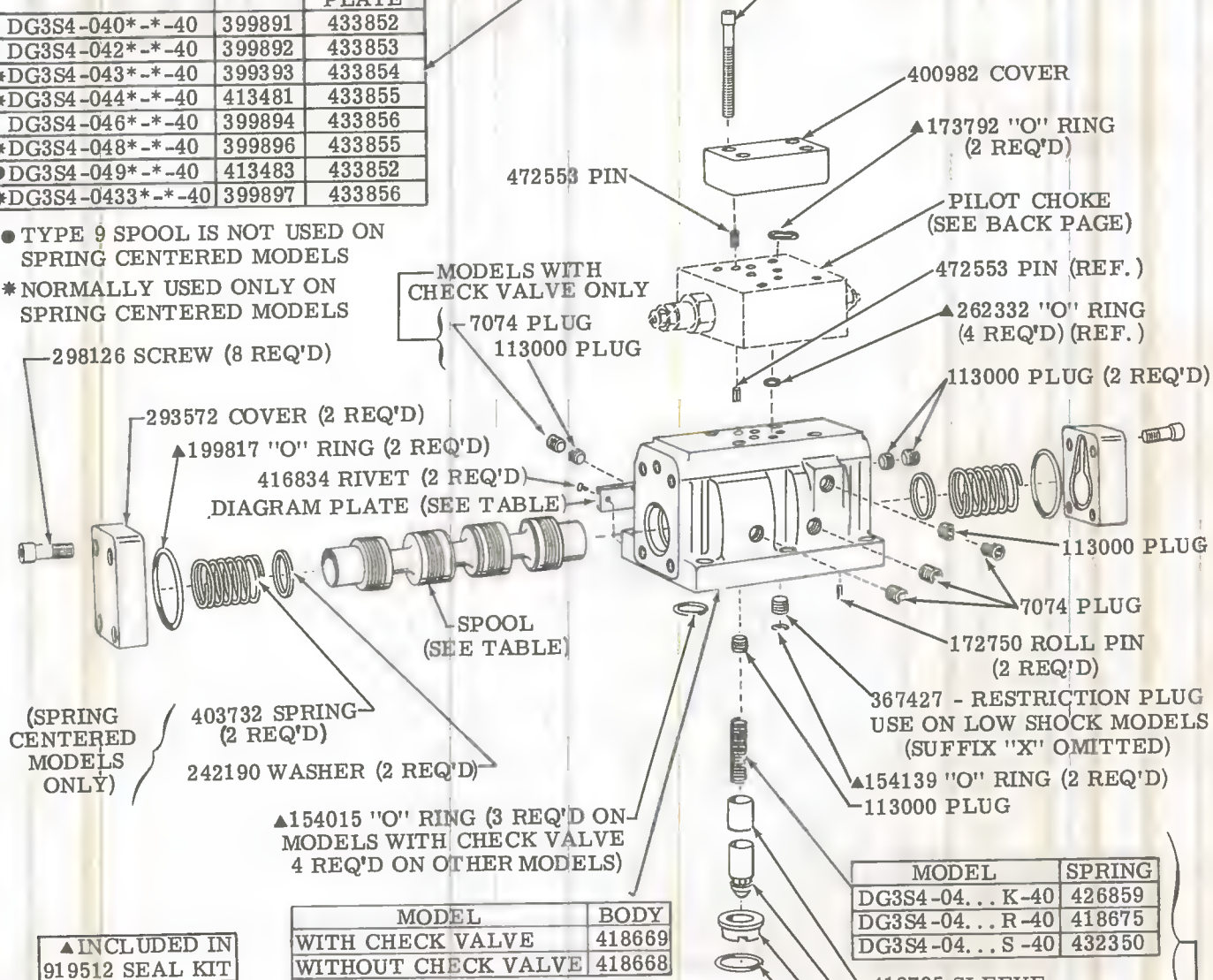
MODEL	SPOOL	DIAGRAM PLATE
DG3S4-040*-*-40	399891	433852
DG3S4-042*-*-40	399892	433853
DG3S4-043-*-40	399393	433854
DG3S4-044-*-40	413481	433855
DG3S4-046*-*-40	399894	433856
DG3S4-048-*-40	399896	433855
●DG3S4-049*-*-40	413483	433852
DG3S4-0433-*-40	399897	433856

- TYPE 9 SPOOL IS NOT USED ON SPRING CENTERED MODELS
- * NORMALLY USED ONLY ON SPRING CENTERED MODELS

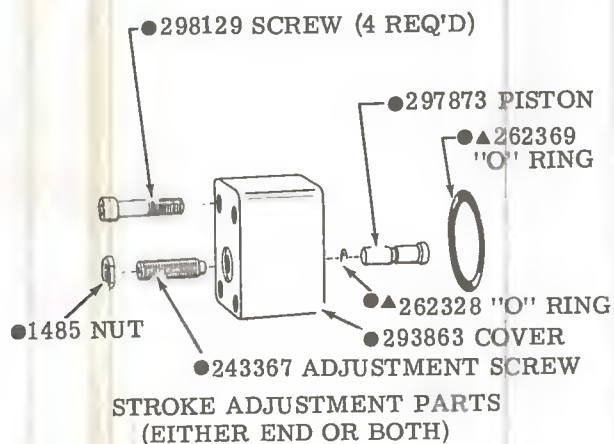
SEE SPOOL ASSEMBLY
NOTE BELOW

SCREW (4 REQ'D)	MODEL
189128	WITH PILOT CHOKE
8077	WITHOUT PILOT CHOKE

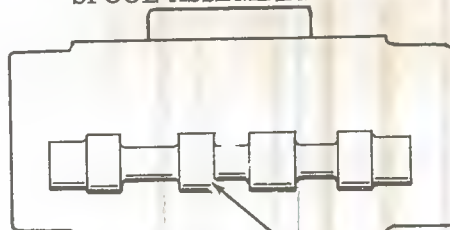
TORQUE TO 50 lb. in. MAXIMUM



● INCLUDED IN STROKE ADJ. KIT 941029



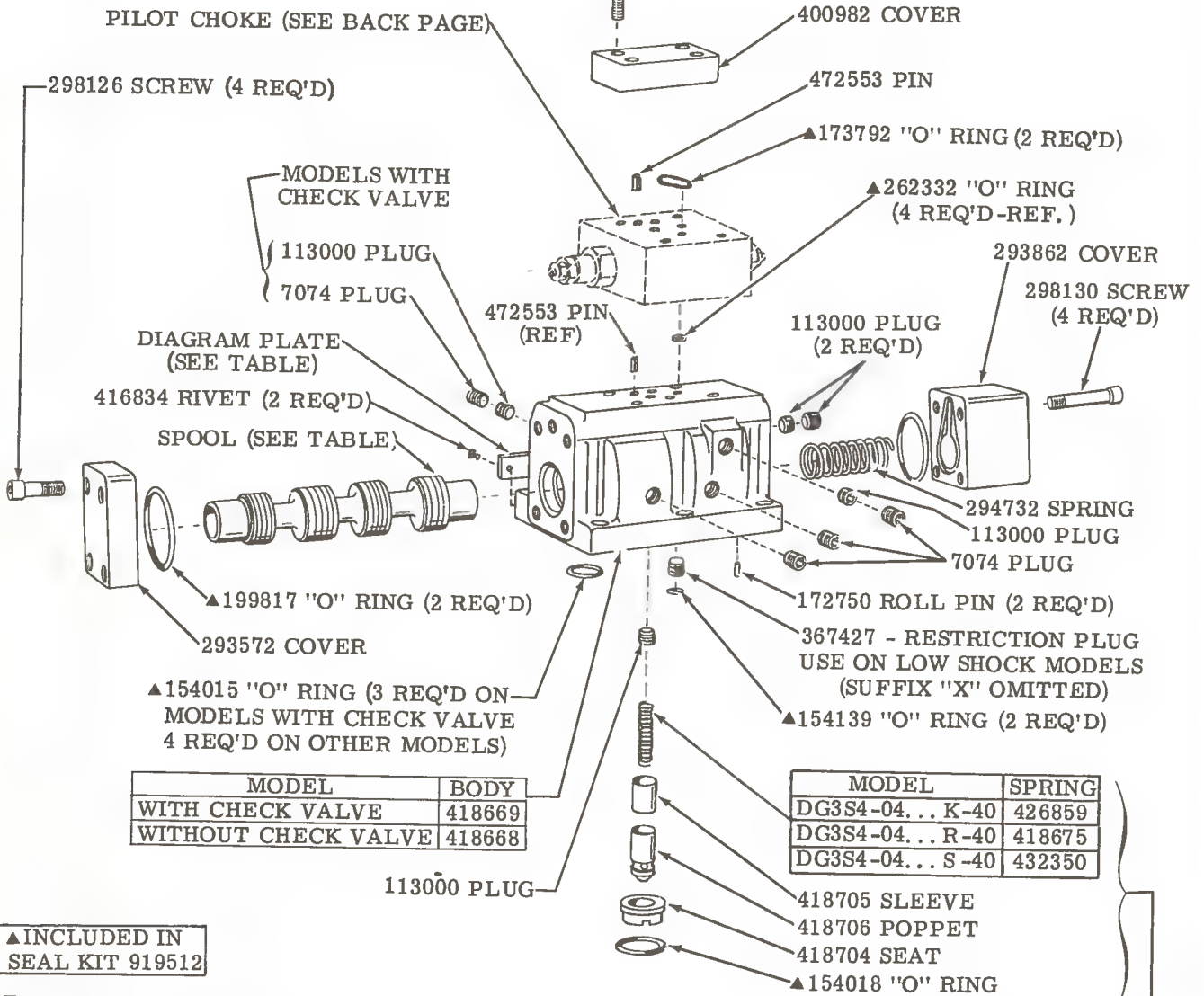
ASSEMBLE TYPE 3 SPOOL WITH NARROW LAND TOWARD "A" END OF UNIT.



SPRING OFFSET MODEL

MODEL	SPOOL	DIAGRAM PLATE	
		R. H.	L. H.
DG3S4-040A...40	399891	433857	434314
DG3S4-042A...40	413482		
DG3S4-046A...40	399894		
DG3S4-049A...40	413483		

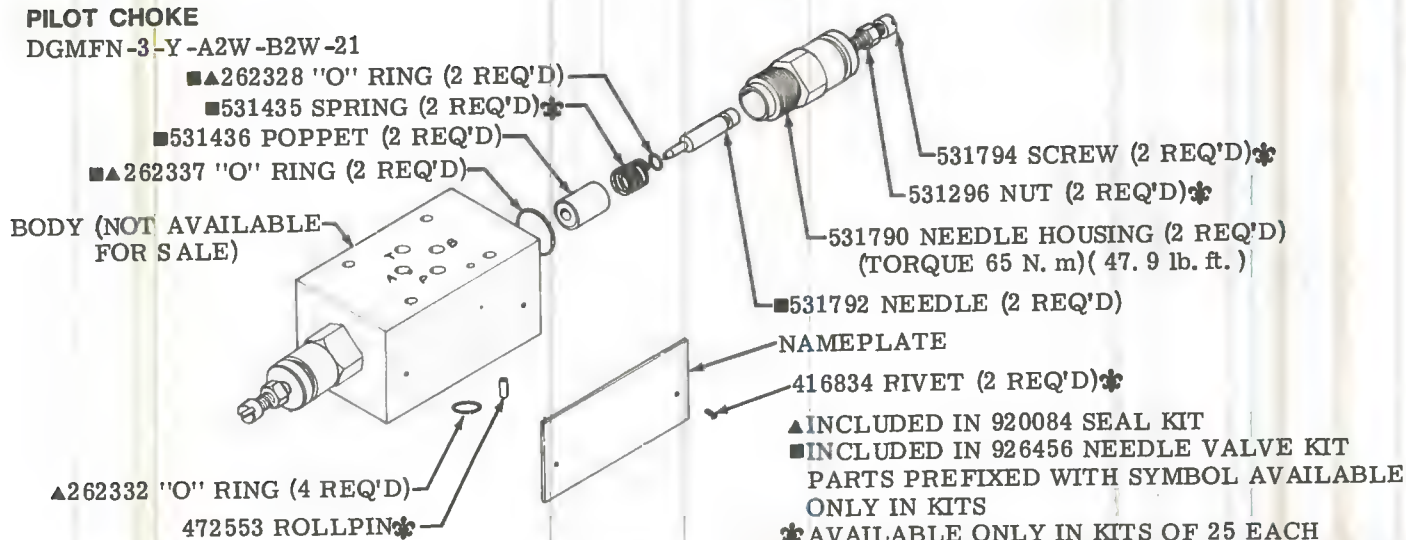
SCREW (4 REQ'D)	MODEL
189128	WITH PILOT CHOKE
8077	WITHOUT PILOT CHOKE
TORQUE TO 50 lb. in. MAXIMUM	



NOTE: R.H. ASSEMBLY SHOWN. FOR L.H. ASSEMBLY THE END COVERS AND SPRING ARE ASSEMBLED ON SIDE OPPOSITE OF THAT SHOWN. FOR STROKE ADJUST PARTS SEE OTHER PAGE.

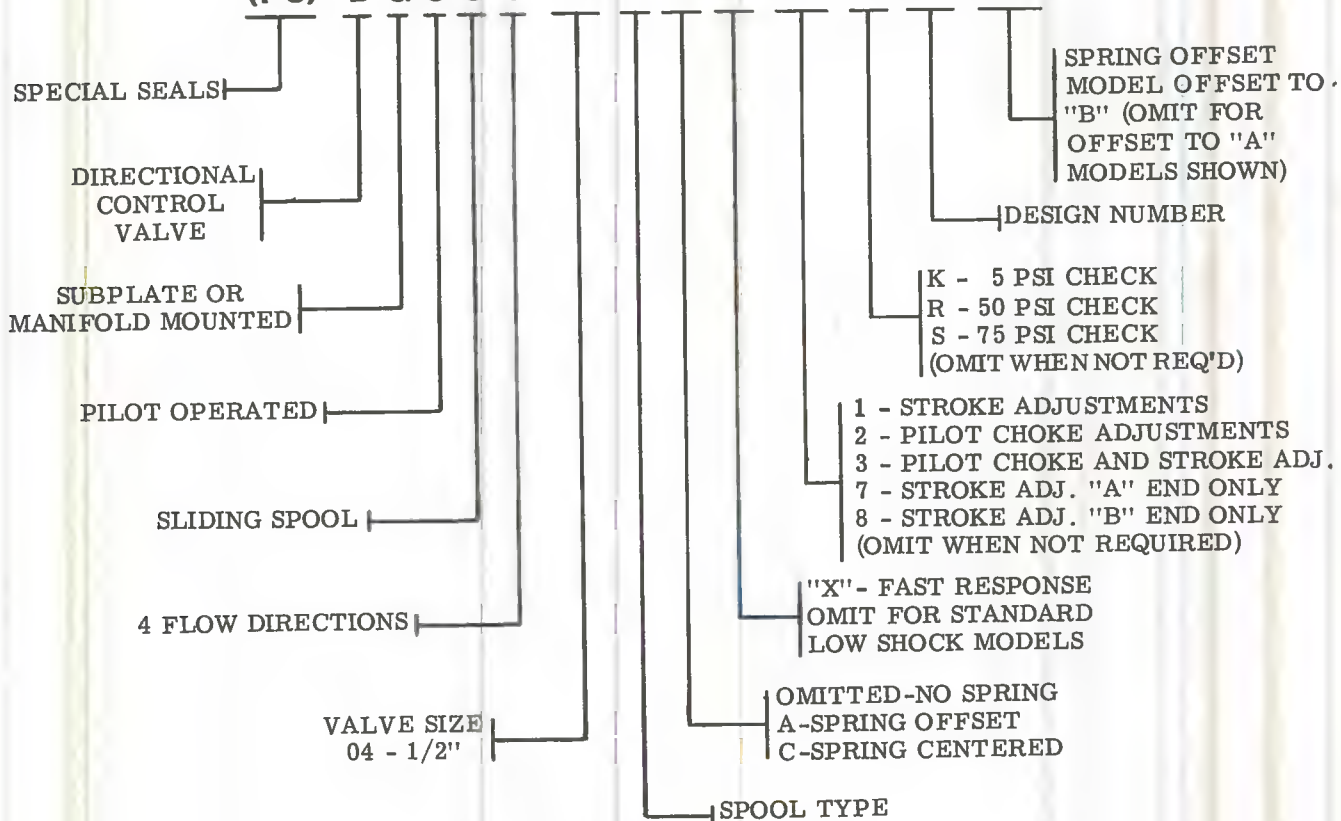
PILOT CHOKE

DGMFN-3-Y-A2W-B2W-21



MODEL CODE BREAKDOWN

(F3) - D G 3 S 4 - 04 * (*) (*) - (*) - R - 40 - (LH)



For satisfactory service life of these components, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from Vickers OFP, OFR, and OFRS series are recommended.

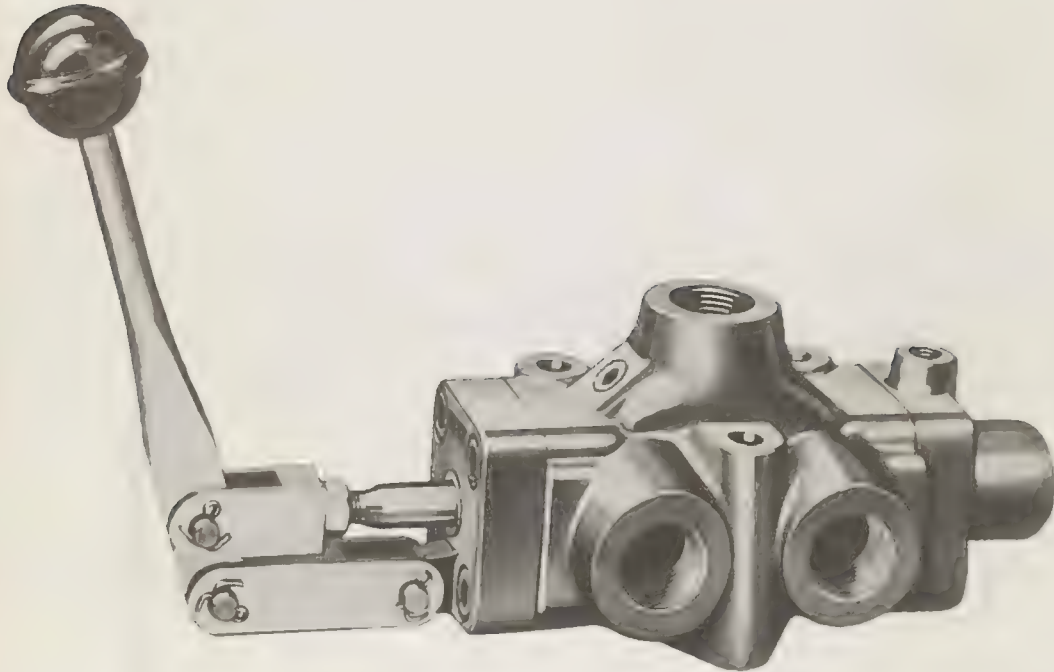
Litho in U. S. A.



Service Parts Information

**Manual
Four-Way
Directional
Valves**

C-430/32/34/76/78-(*)-(*)-(S*)
C-1410/12/30/32/34/50/52/54-(*)-(*)-(S*)
C2-1434-1454-(*)-(*)



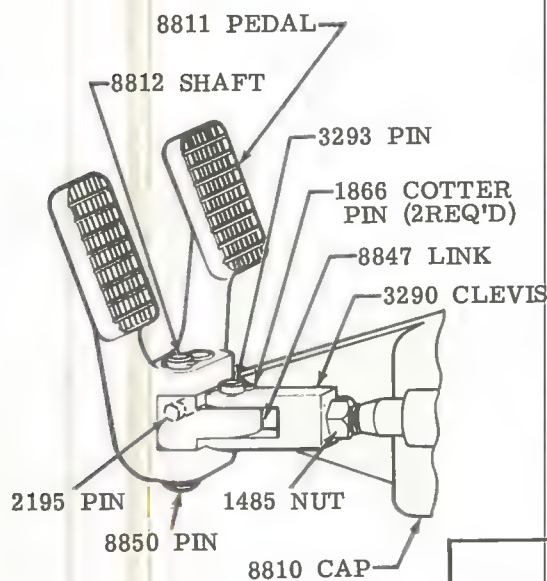
Vickers, Incorporated

1401 Crooks Road
Troy, Michigan 48064

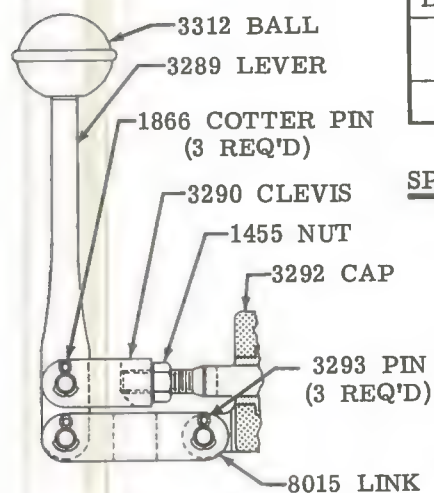
Revised 11-1-85

I-3553-S

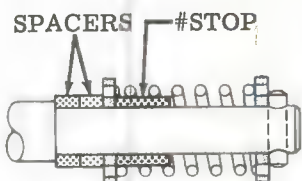
C-430, C-432, C-476, C-478,
C-1410, C-1412



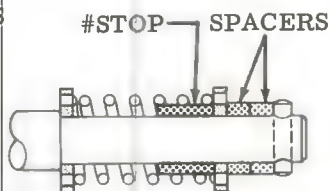
SUFFIX "F" MODELS



SUFFIX "C" MODELS



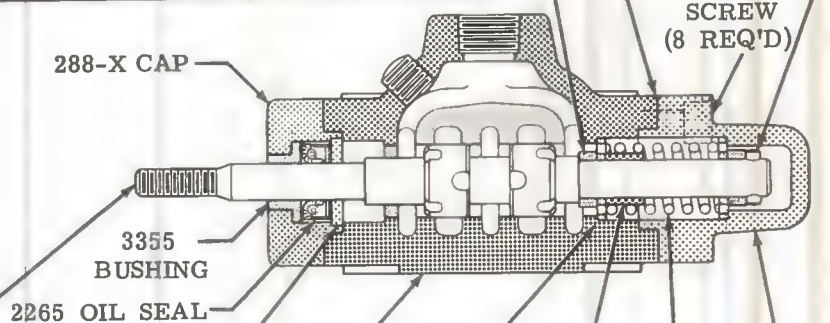
SUFFIX "A" MODELS



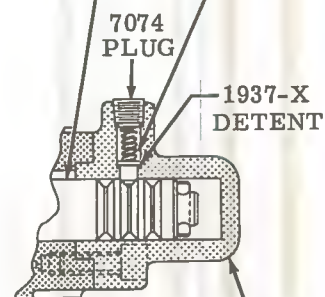
SUFFIX "B" MODELS

	MODELS	SPACER	QTY.
	C-476/78-(*)-NS	2402	1
	C-430/32/76/78 BASIC, SUFFIX A OR B		2
	C-1410, C-1412 SUFFIX A OR B	8947	2
	C-1410/12 BASIC		3

BASIC MODEL-STEM CONTROL
SPRING CENTERED SPOOL ASSY. SHOWN



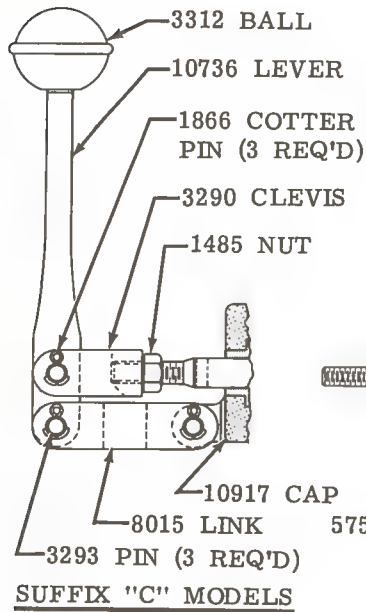
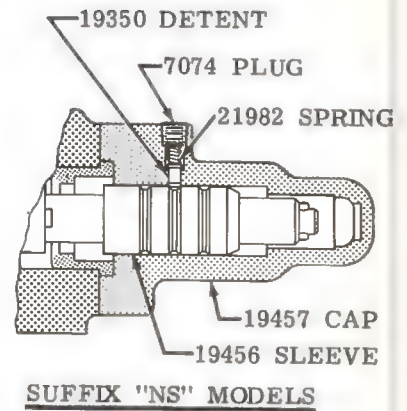
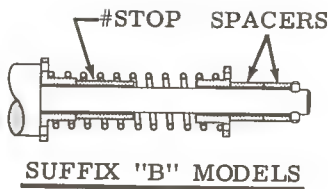
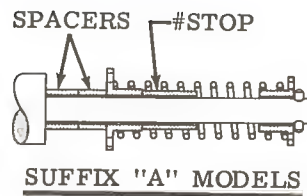
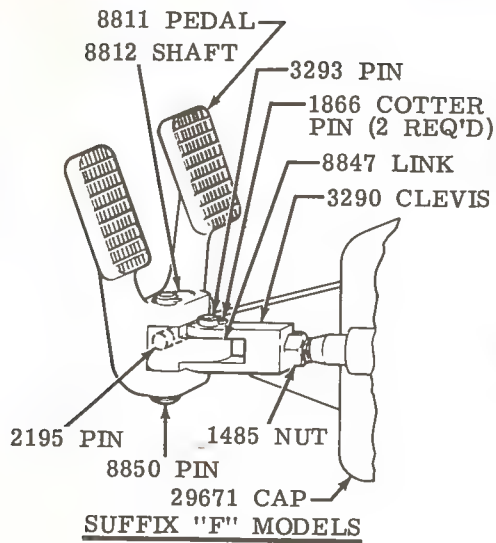
MODEL	SLEEVE	SPRING
C- 430/32-(*)-NS	49204	21982
C- 476/78-(*)-NS	20079	
C-1410/12-(*)-NS	21567	2954



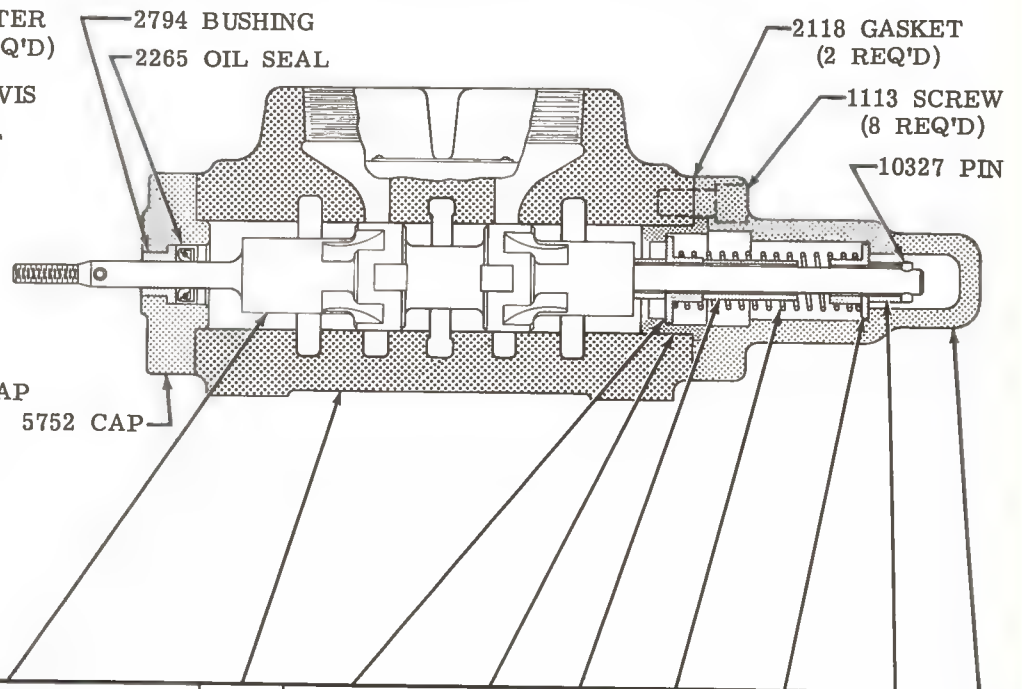
22179 CAP
SUFFIX "NS" MODELS

MODEL	VALVE SPOOL					WASHER	BODY	NOT USED ON "NS" MODELS				
	BASIC	S1	S2	S3	S4			WASHER	#STOP	SPRING	CAP	
C-430	11590	10217	27826	—	—	10670	332-X	335-X (2) REQ'D	—	2271	333-X	
C-432	929-X	—	—	15250	32031		2155-X			177640		
C-476	1897-X	—	—	10369	2171-X				8946	8944		27271
C-478	1737-X	33281	33282	—	—							
C-1410	10714	30183	31712	—	—	—	8946					
C-1412	8943	—	—	27936	33283							

C-1430, C-1432,
C-1450, C-1452

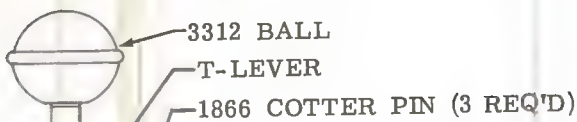


BASIC MODEL-STEM CONTROL
SPRING CENTERED SPOOL ASSY. SHOWN

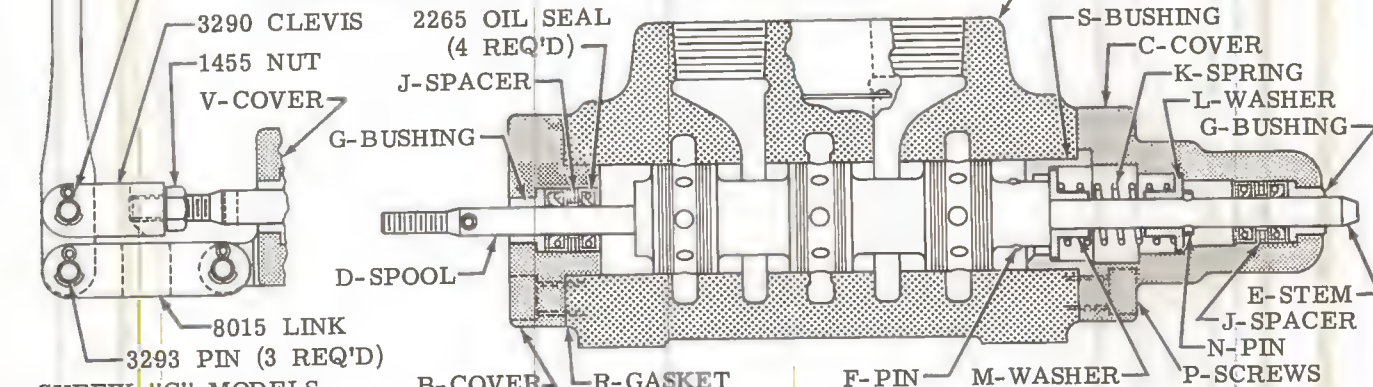


MODEL	VALVE SPOOL					BODY	NOT USED ON "NS" MODELS						
	BASIC	S1	S2	S3	S4		COLLAR	BUSHING	#STOP	SPRING	COLLAR	SPACER	CAP
C-1430	76638	76640	76641	—	—	5701	5708	5709	38798 SEE NOTE ↓	2980	5707	5749 (2) REQ'D	5751
C-1432	76639	—	—	76642	76643								
C-1450	76638	76640	76641	—	—	17232							
C-1452	76639	—	—	76642	76643								
NOTE: STOP 38798 REPLACED BY 35510 ON SUFFIX "F" MODELS													

C-434, C-1434, C-1454,
C2-1434, C2-1454



BASIC MODEL-STEM CONTROL
SPRING CENTERED SPOOL ASSY. SHOWN



SUFFIX "NS" MODELS

SUFFIX "C" MODELS

PART LETTER AND NAME	SUFFIX LETTER	NO. REQ.	C-434	C-1434	C-1454	C2-1434	C2-1454
A BODY	ALL	1	5646	5701	17232	5701	17232
B COVER	EXCEPT -C	1	3346	5702	5702	—	—
C COVER	EXCEPT -NS	1	3345	5703	5703	—	—
	-NS	1	5841	20666	20666	31477	31477
D SPOOL	EXCEPT -NS	1	3350	5705	5705	—	—
	-NS	1	19436	5705	5705	5705	5705
E STEM	EXCEPT -NS	1	—	5706	5706	—	—
	-NS	1	—	20664	20664	5706	5706
F PIN	ALL	1	—	12273	12273	12273	12273
G BUSHING	ALL	2	3355	2794	2794	2794	2794
J SPACER	ALL	2	3356	5465	5465	5465	5465
K SPRING	EXCEPT -NS	1	2949	2953	2953	—	—
L WASHER	EXCEPT -NS	1	3354	5707	5707	—	—

PART LETTER AND NAME	SUFFIX LETTER	NO. REQ.	C-434	C-1434	C-1454	C2-1434	C2-1454
M WASHER	EXCEPT -NS	1	3353	5708	5708	—	—
N PIN	EXCEPT -NS	1	10187	10327	10327	—	—
P SCREWS	ALL	8	1071	1113	1113	1113	1113
R GASKET	ALL	2	40191	2118	2118	2118	2118
S BUSHING	ALL	1	—	5709	5709	5709	5709
T LEVER	-C	1	7156	10736	10736	10736	10736
V COVER	-C	1	7157	15163	15163	15163	15163
X DETENT	-NS	1	1937-X	19350	19350	19350	19350
Y SPRING	-NS	1	2954	19467	19467	19467	19467
Z SLEEVE	-NS	1	—	20665	20665	31476	31476
AA PIN	-NS	1	—	10327	10327	10327	10327

MODEL CODE BREAKDOWN

C(2)-(1)4* *-(*)-(*)-(S*)

DESIGN

2-SECOND DESIGN
OMITTED-BASIC DESIGN

PORT SIZES

47-3/8" NPT
43-3/4" NPT
141-1" NPT
143-1 1/4" NPT
145-1 1/2" NPT

BASIC SPOOL

0-OPEN CENTER
2-CLOSED CENTER
4-TANDEM CENTER
6-CLOSED CENTER
8-OPEN CENTER

SPECIAL FEATURES

OMITTED-STANDARD
S* - SPECIAL

POSITIONING

A-SPRING OFFSET TO
EXTENDED POSITION
B-SPRING OFFSET TO
RETRACTED POSITION
NS-NO SPRING, THREE
POSITION DETENT
OMITTED-SPRING CENTERED

CONTROL

C-LEVER
F-TREADLE
OMITTED-STEM

For satisfactory service life of these components, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from Vickers OFF, OFR, and OFRS series are recommended.

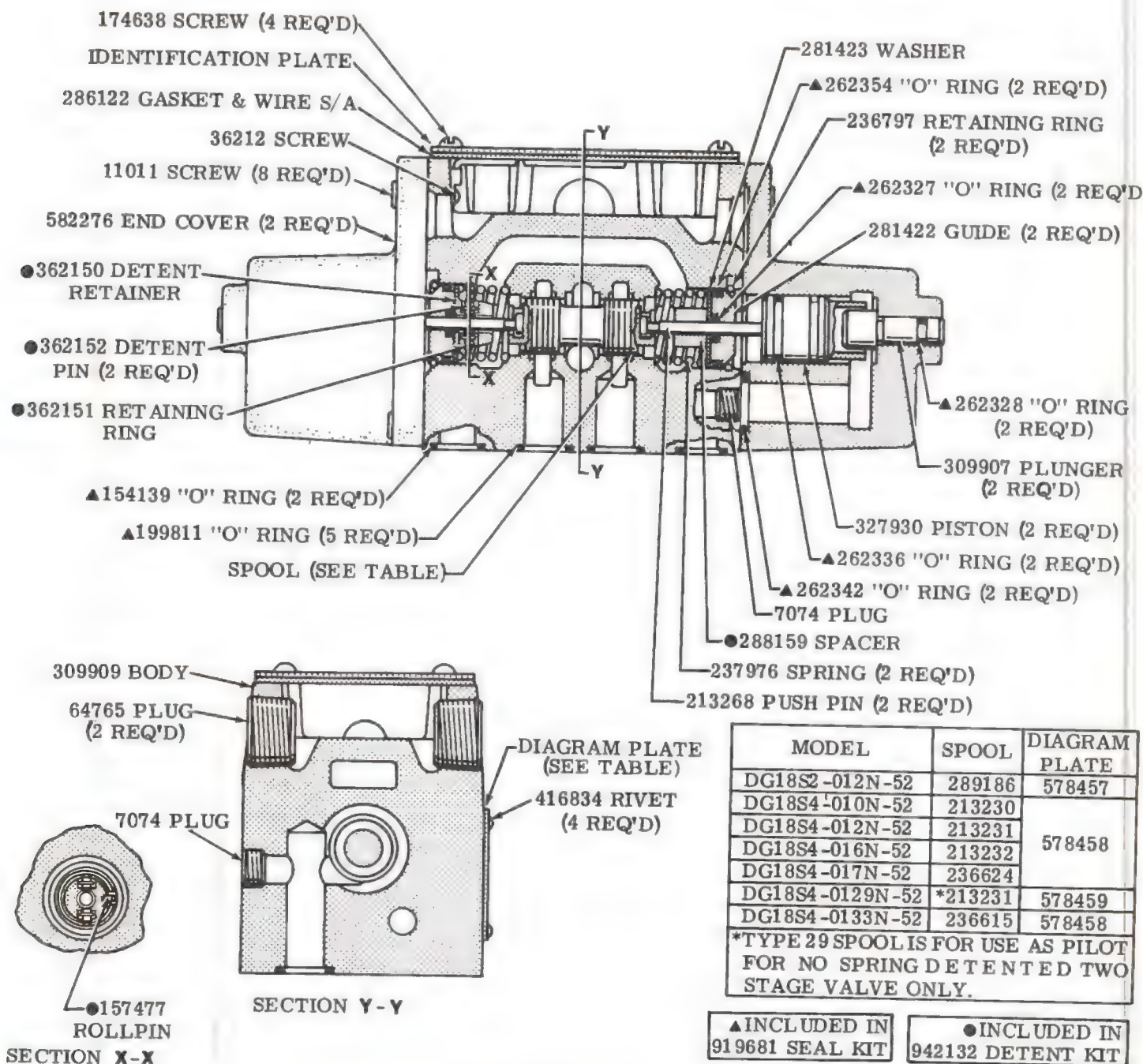
Litho in U.S.A.

Service Parts Information

**NO-SPRING DETENTED
AIR OPERATED
DIRECTIONAL VALVES**

DG18S2-012N-52
DG18S4-01*(*)N-52

VICKERS®
A TRIMONA COMPANY



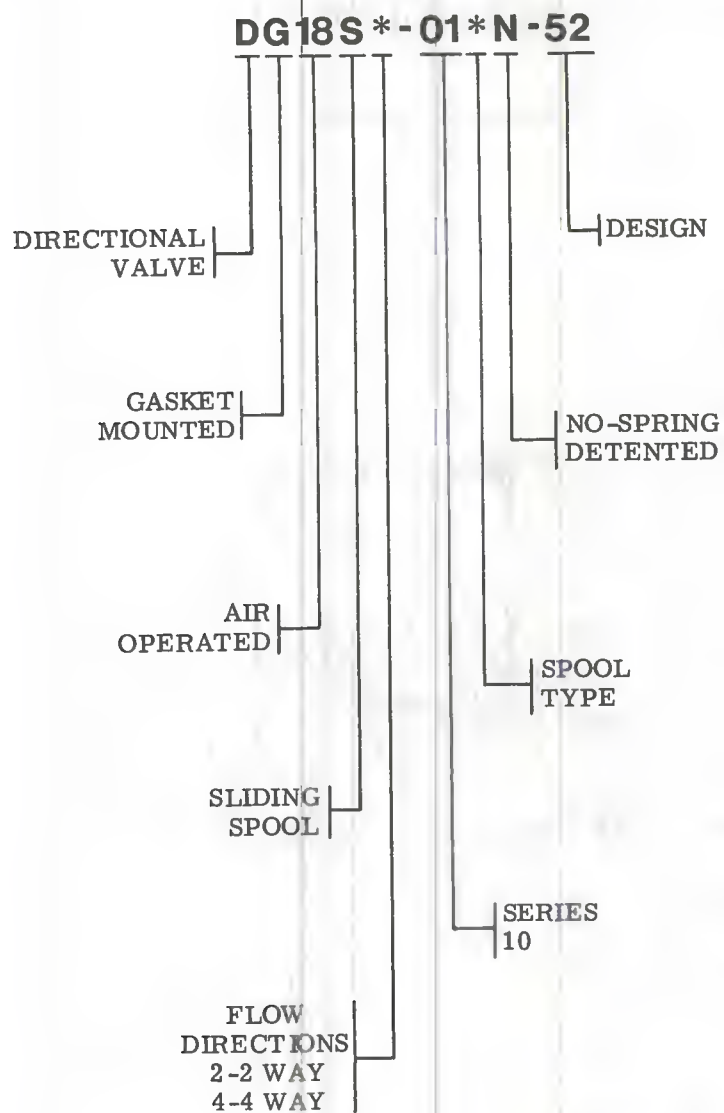
Vickers, Incorporated
P.O. Box 302
Troy, Michigan 48007-0302

Revised 11-1-85

I-3554-S

97

MODEL CODE BREAKDOWN



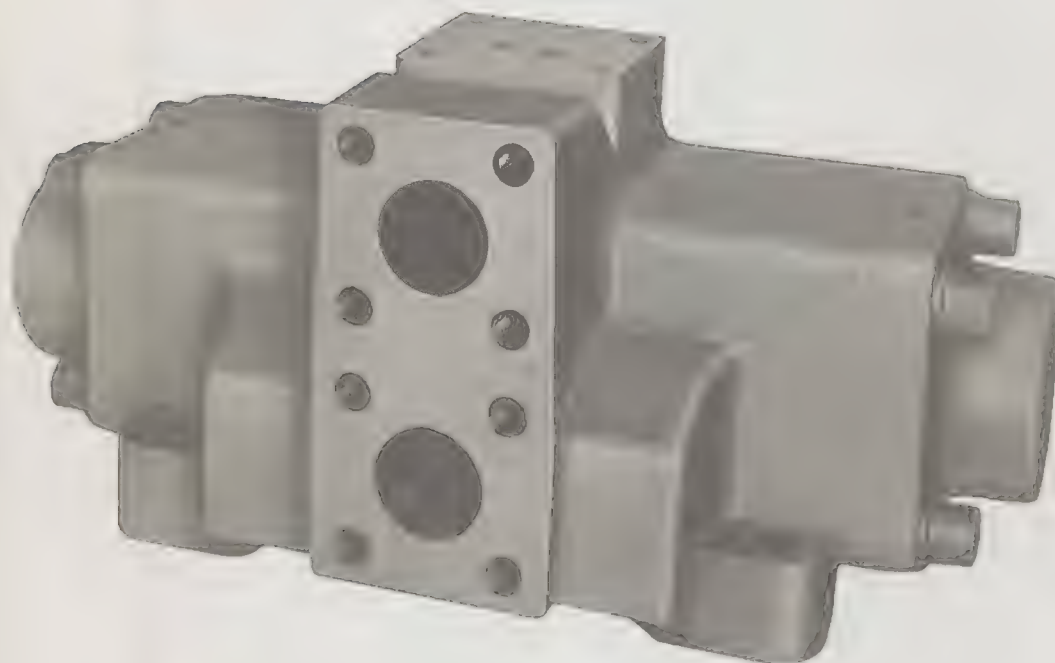
For satisfactory service life of these components, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from Vickers OFP, OFR, and OFRS series are recommended.

Litho in U. S. A.

Service Parts Information

**Spring Offset
Pilot Operated
Directional
Control
Valve**

DF3S4-16*A-*-53



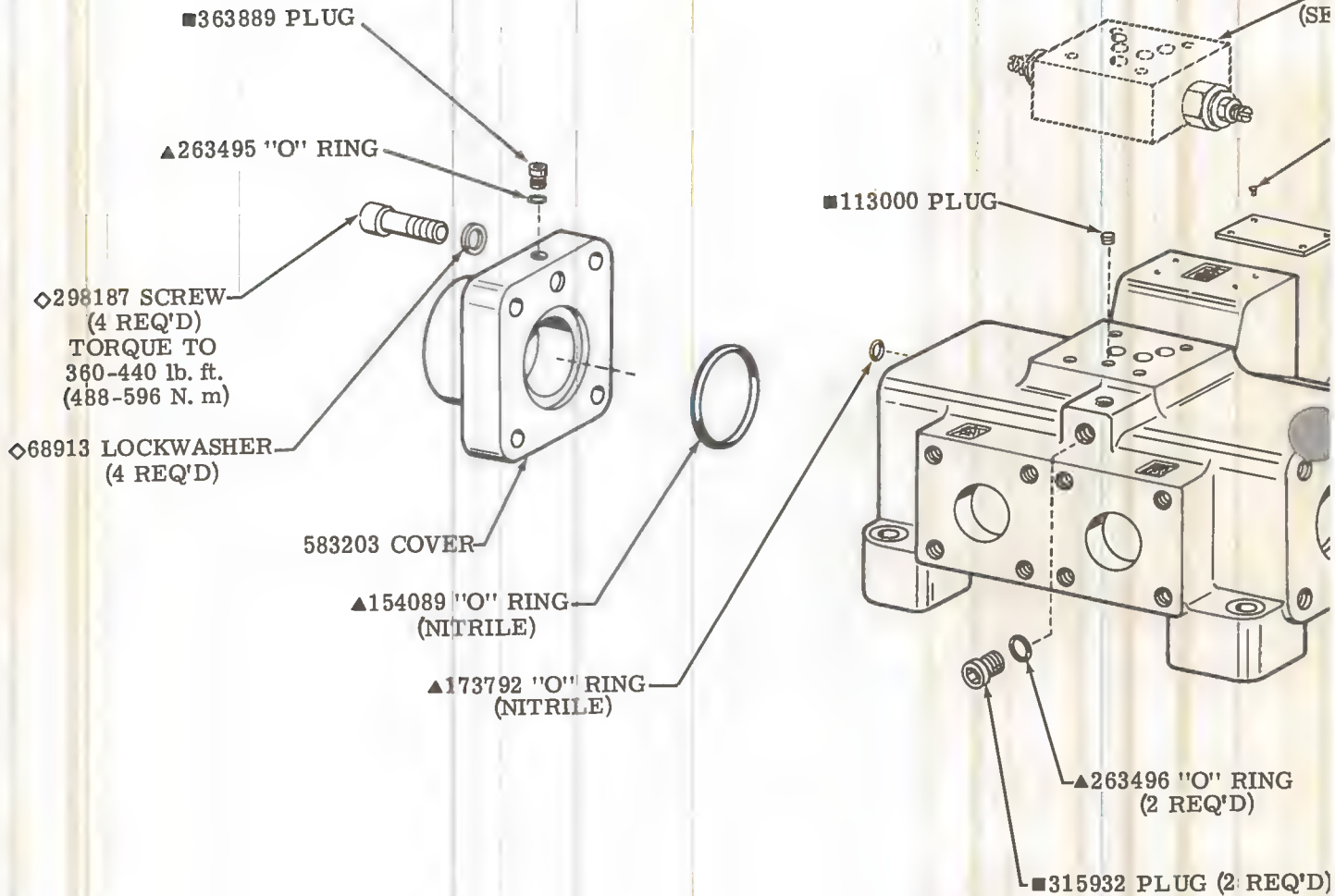
Vickers, Incorporated

1401 Crooks Road
Troy, Michigan 48084

Revised 9-1-85

I-3555-S

MODEL	BOLT (4 REQ'D)
W/PILOT CHOKE	10937
W/OUT PILOT CHOKE	1033
TORQUE TO 100 - 112 lb. in. (11.3 - 12.7 N. m)	



▲▲INCLUDED IN STD. SEAL KIT 919406
 F3 EQUIVALENT SEAL KIT 919410
 ◇INCLUDED IN FASTENER KIT 941309
 □INCLUDED IN BOLT KIT 255651
 ■INCLUDED IN BOLT KIT 255637
 ■PLUG TORQUES (SEE TABLE)

NOTE
 SAE STRAIGHT THREAD PLUGS
 USED ON EXTERIOR OF VALVE

SEE PARTS DRAWING I-3962-S
 FOR CONNECTION FLANGES

OVER

'O' RING (2 REQ'D)

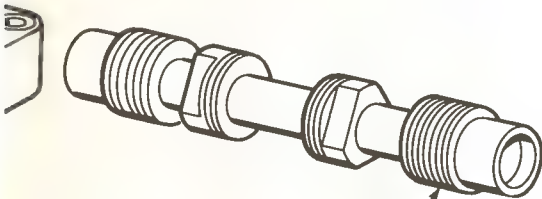
F CHOKE
CK PAGE)

34 RIVET (4 REQ'D)

IDENTIFICATION PLATE W/
CIRCUIT DIAGRAM (SEE TABLE)

583197 BODY
(NOT AVAILABLE
FOR SALE)

▲173792 "O" RING (NITRILE)



SPOOL (SEE TABLE)

▲154089 "O" RING (NITRILE)

297901 SPRING

583202 COVER

◇298187 SCREW (4 REQ'D)
TORQUE TO 360-440 lb. ft.
(488-596 N. m)

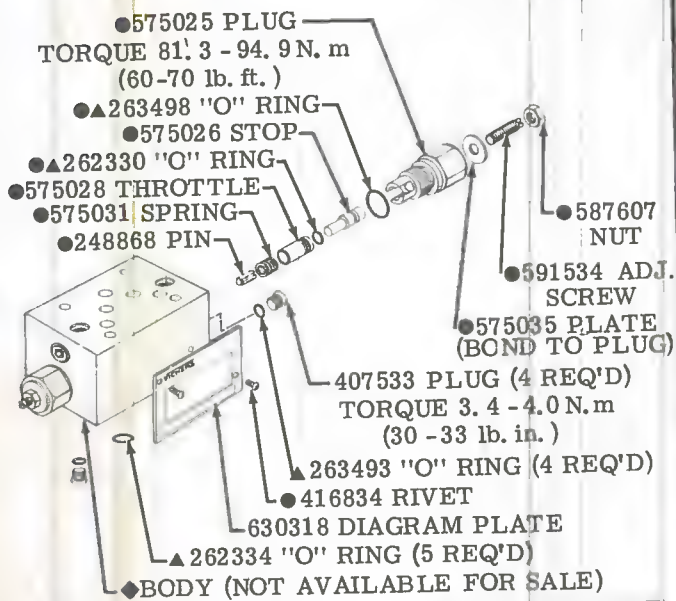
■363889 PLUG
TORQUE TO
150-160 lb. in.
(16.9-18.07 N. m)

▲263495 "O" RING

◇68913
LOCKWASHER
(4 REQ'D)

NOTE
PART NUMBERS INCLUDED
IN KITS WILL NOT BE SOLD
SEPARATELY.

MODELS WITH PILOT CHOKE

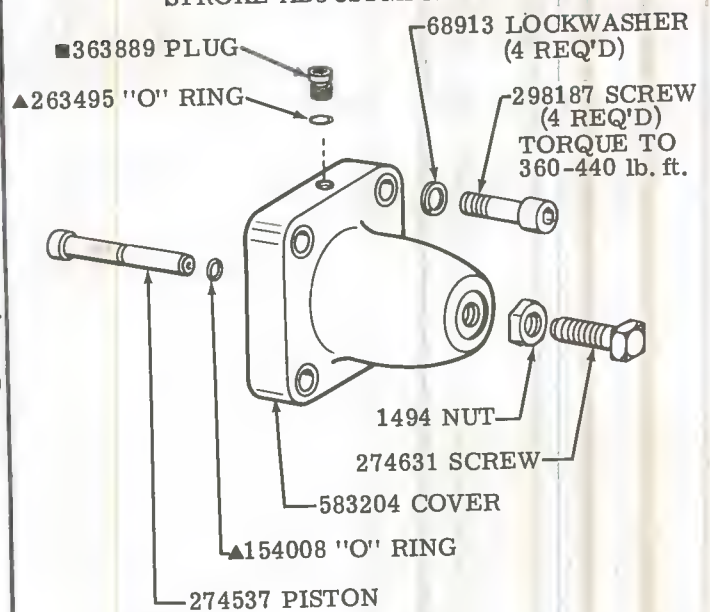


◆ORDER COMPLETE CHOKE (DGMFN-5-Y-AW-BW-20) IF BODY IS REQUIRED.

●QTY. 2 REQ'D

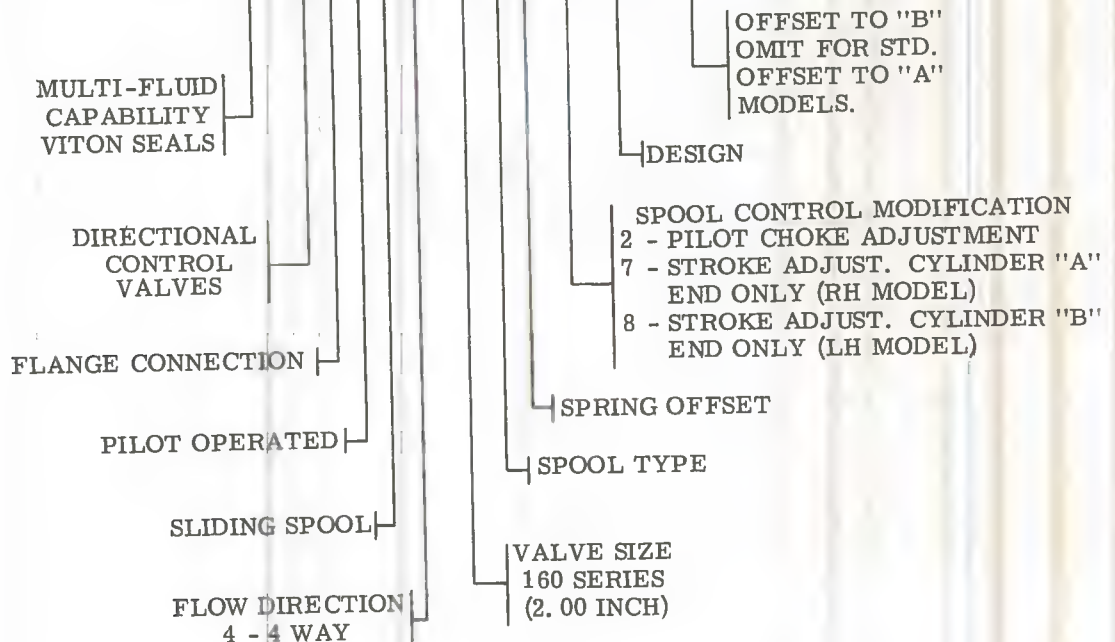
▲INCLUDED IN 920246 SEAL KIT

STROKE ADJUSTMENT PARTS



MODEL CODE BREAKDOWN

(F3) DF3S4-16*A-*-53-(LH)



For satisfactory service life of these components in industrial applications, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from Vickers OFP, OFR, and OFRS series are recommended.

Litho in U. S. A.

VICKERS®
A TRINITY COMPANY

Service Parts Information

Wet Armature
Solenoid Operated
Directional Valve

DG4S*-01*A-W(3)*-50



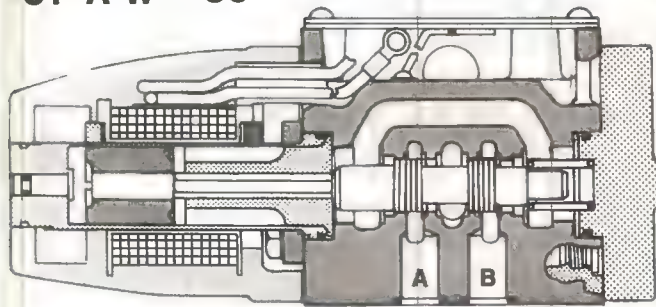
Vickers, Incorporated

1401 Crooks Road
Troy, Michigan 48064

Revised 10-1-88

I-3557-S

DG4S*-01*A-W-*-50



NOTE
RIGHT HAND ASSEMBLY SHOWN. FOR LEFT HAND ASSEMBLY ALL PARTS, EXCEPT BODY, ARE VERSED. EXAMPLE OF LEFT HAND MOD DG4S*-012A-W-*-50-LH.

MODEL	SPOOL	DIAGRAM PLATE	SPOOL KIT
DG4S2-012A-W-*-50	573396	290347	940701
DG4S2-012A-W-*-50LH		577488	941010
DG4S4-010A-W-*-50	572287	290348	940703
DG4S4-010A-W-*-50LH		577490	941011
DG4S4-012A-W-*-50	463426	290348	940704
DG4S4-012A-W-*-50LH		577490	941012
DG4S4-016A-W-*-50	572288	290348	940705
DG4S4-016A-W-*-50LH		577490	941013

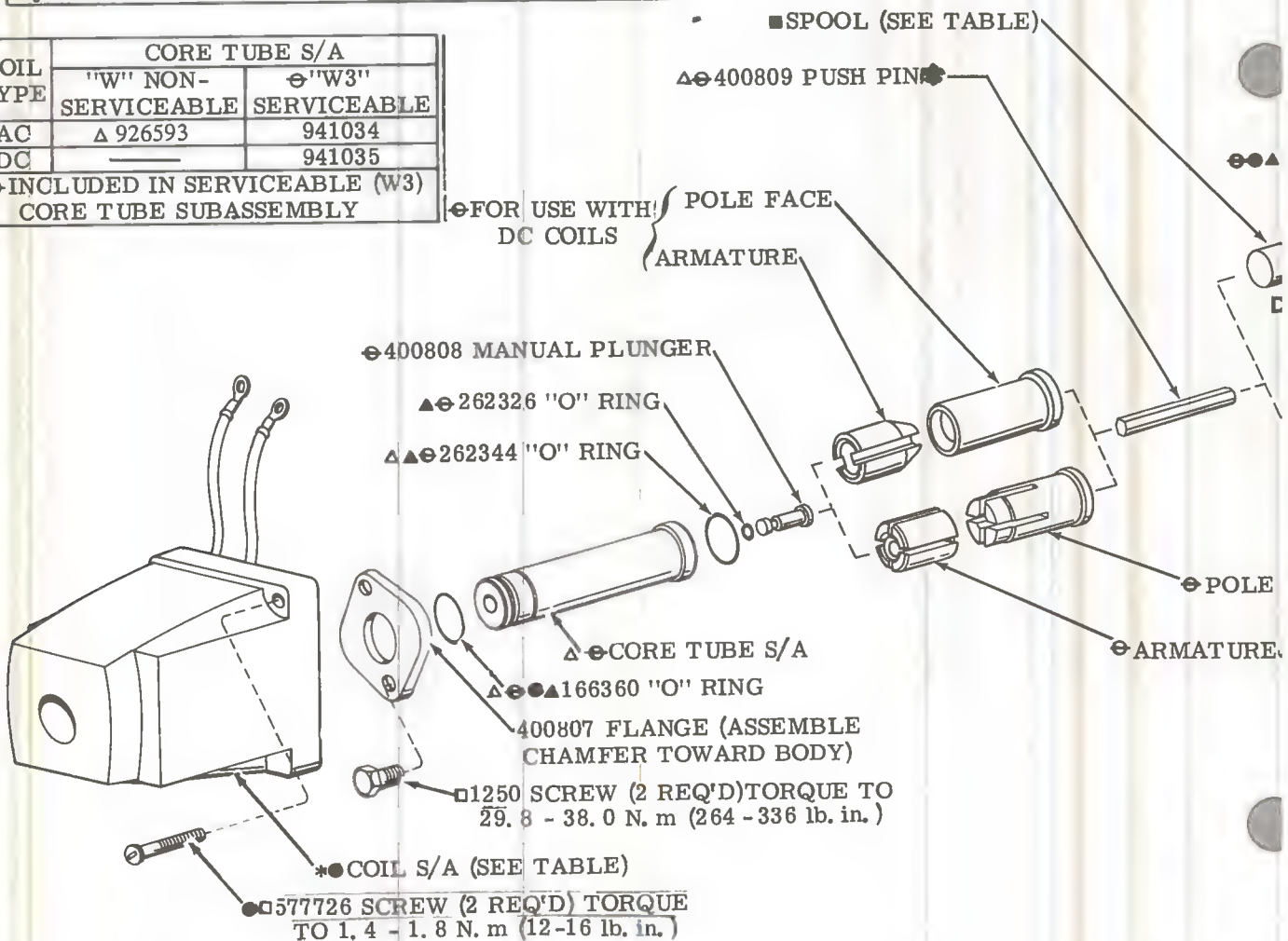
NOTE
PART NUMBERS PREFIXED WITH A SYMBOL ARE AVAILABLE ONLY AS SERVICE KITS.

☛ SUFFIX SYMBOL PERTAINS ONLY TO VICKERS MATERIAL CONTROL

SPOOL KIT INCLUDES SPOOL, DIAGRAM PLATE, SEAL KIT, AND PARTS PREFIXED WITH A CLOSED SQUARE SYMBOL (■).

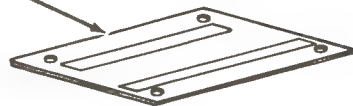
COIL TYPE	CORE TUBE S/A	
	"W" NON-SERVICEABLE	☉ "W3" SERVICEABLE
AC	Δ 926593	941034
DC	—	941035

☉ INCLUDED IN SERVICEABLE (W3) CORE TUBE SUBASSEMBLY



□174638 SCREW (4 REQ'D) TORQUE
TO 0.8-0.9 N.m (7-9 lb. in.)

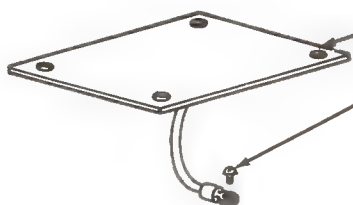
NAMEPLATE (NOT
AVAILABLE FOR SALE)



1286122 GASKET & WIRE S/A

□36212 SCREW

BODY (NOT AVAILABLE FOR SALE)



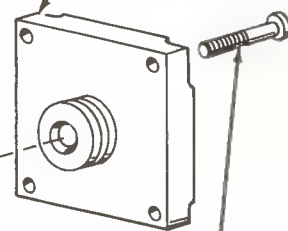
▲263493 "O" RING

407533 PLUG
TORQUE TO
12.1 - 12.4 N.m
(107 - 110 lb. ft.)

■236451 SPRING

▲262344 "O" RING

400846 COVER

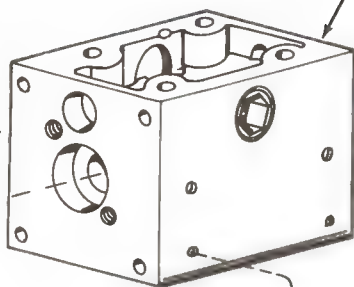


□11012 SCREW (4 REQ'D)
TORQUE TO 4.9 - 6.0 N.m
(43-53 lb. in.)

GASKET

012A

DG4S4-012 A

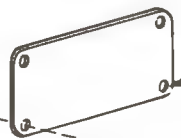


407533 PLUG TORQUE
TO 12.1-12.4 N.m
(107 - 110 lb. ft.)

▲263493 "O" RING

■DIAGRAM PLATE (SEE TABLE)

□416834 RIVET (4 REQ'D)



●▲262334 "O" RING
(F3 VITON - 5 REQ'D)

R USE WITH
AC COILS

□INCLUDED IN
FASTENER KIT 942465

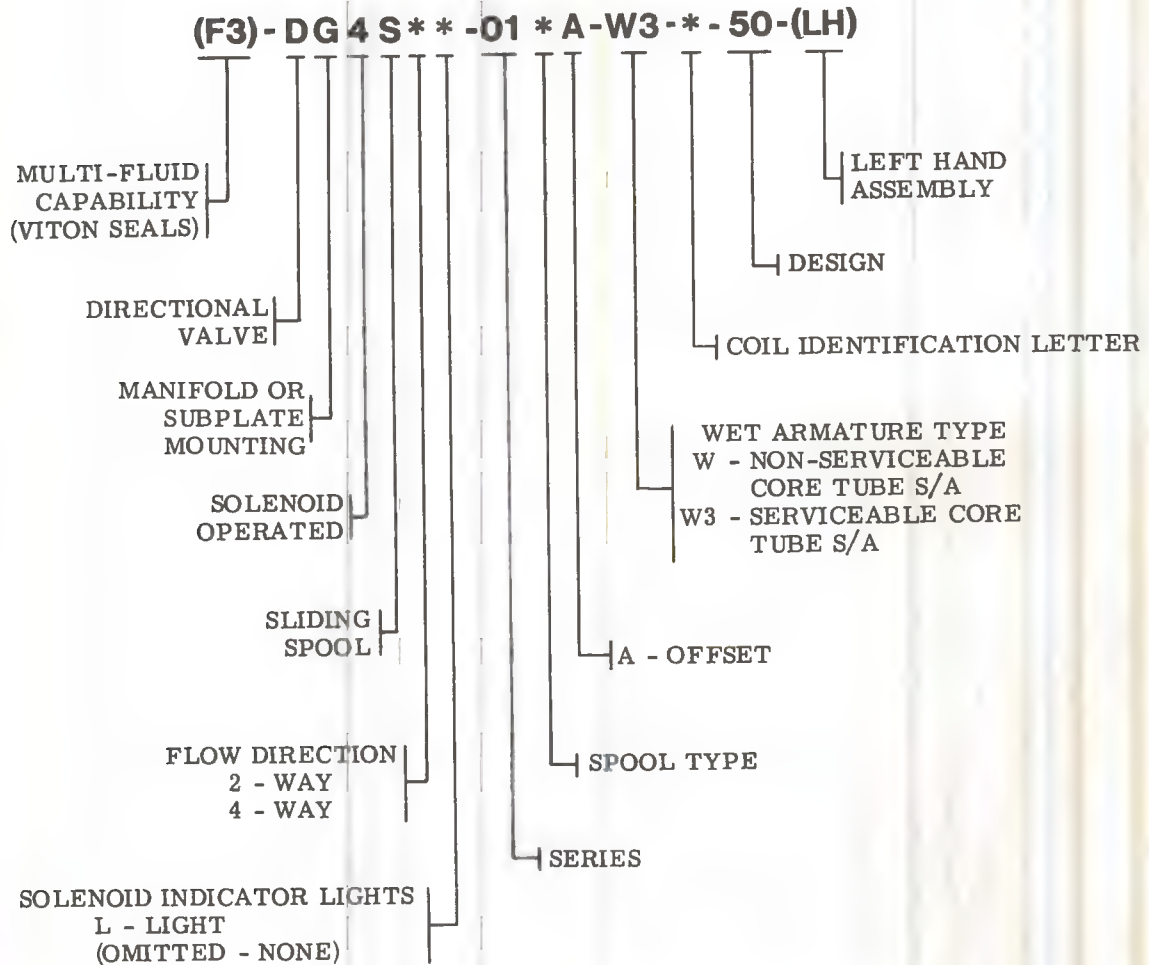
▲INCLUDED IN
F3 SEAL KIT 920109

●INCLUDED IN COIL KIT

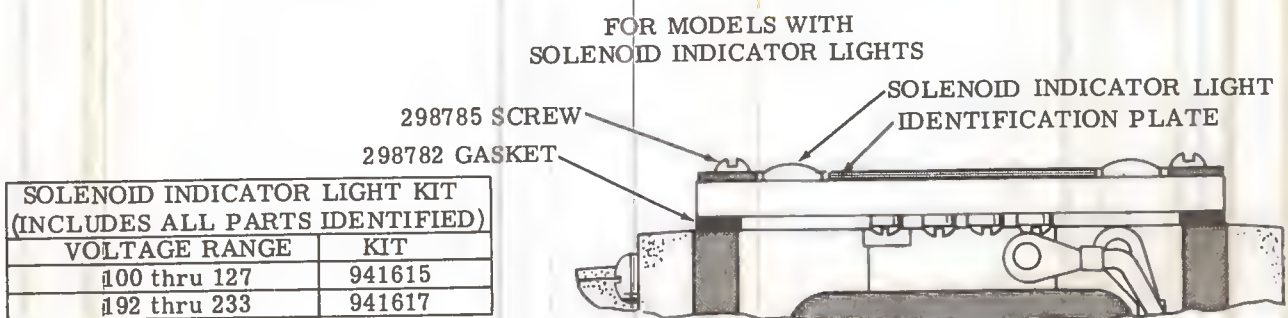
● COIL S/A	COIL KIT	AC VOLT/Hz	DC VOLT	COIL CODE	DIN COIL
400823	942466	110/50, 115/60, 120/60		B	463328
400824	942467	220/50, 230/60		D	463329
400825	942468	440/50, 460/60		M	463330
400826	942469		12	G	463331
400827	942470		24	H	463332
435755	941017	127/50		EG	
582214	941109		250	X	617244
730273	926461		48	J	
		100/50, 100/60		T	977929
		380/50, 380/60		DZ	617370

*CAUTION
CORRECT ARMATURE AND POLE FACE MUST BE USED
FOR AC AND DC OPERATION.

MODEL CODE BREAKDOWN



WARNING: USE THIS DRAWING FOR PARTS INFORMATION ONLY.



NOTE
REFER TO PARTS DRAWING I-3487-S
FOR MODELS WITH PLUG-IN FEATURE.

To insure sustained efficiency and maximum trouble free life of this precision equipment, initial and continuous full flow filtration of the fluid medium is essential. Select and apply filters from the Vickers OFP, OFR, and OFRS series, which are available in 3, 10, and 25 micrometre filtration ratings.

Litho in U. S. A.

Service Parts Information

Wet Armature
Solenoid
Operated
Directional
Valves

F6-DG4S4-01*(*)C-W3-*-50



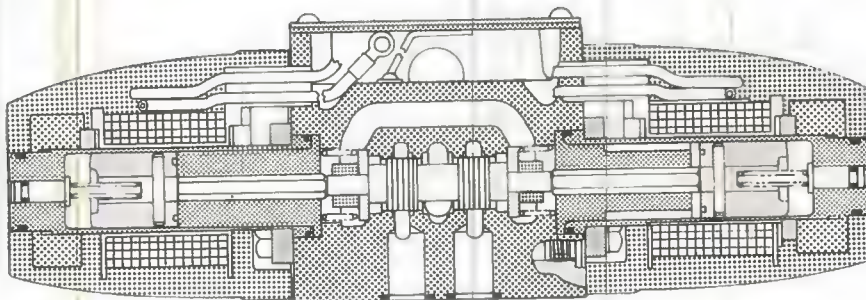
Vickers, Incorporated

1401 Crooks Road
Troy, Michigan 48064

Revised 5-1-87

I-3642-S

122



NOTE
PART NUMBERS PREFIXED WITH
A SYMBOL ARE AVAILABLE ONLY
AS SERVICE KITS.

***ASSEMBLE WASHER WITH
SHARP BREAK EDGE TOWARD
OUTSIDE OF VALVE.**

MODEL	SPOOL	DIAGRAM PLATE	SPOOL KIT
F6-DG4S4-010C-W3-*-50	463385	290341	940711
F6-DG4S4-011C-W3-*-50	463386	290342	940712
F6-DG4S4-012C-W3-*-50	463387	290343	940713
F6-DG4S4-013C-W3-*-50	463388	290344	940714
F6-DG4S4-016C-W3-*-50	463389	290345	940715
F6-DG4S4-0168C-W3-*-50		577480	*941014
F6-DG4S4-017C-W3-*-50	463390	290346	940716
F6-DG4S4-0178C-W3-*-50		577482	*941015
F6-DG4S4-018C-W3-*-50	463391	290340	940717
F6-DG4S4-0133C-W3-*-50	463392	577484	940718
ASSEMBLE TYPE 1 SPOOL WITH RELIEVED LAND TOWARD "A" PORT.			
ASSEMBLE TYPE 3 SPOOL WITH NARROW LAND TOWARD "A" PORT.			
SPOOL KIT INCLUDES SPOOL, DIAGRAM PLATE, SEAL KIT AND PARTS PREFIXED WITH A CLOSED SQUARE SYMBOL (■).			
* ORDER THIS SPOOL KIT WHEN VALVE IS USED AS THE PILOT STAGE ON DG5S4-***4/8C/D MODELS.			

▲263

✱407533
(TOR
12.1 - 12
(107 - 1

■SPOOL (SEE TABLE)

*■400816 WASHER

■290072 SPRING

■217323 SPRING
(DG4S4-018 ONLY)

■573395 SPACER (POSITION
COUNTERBORE TOWARD
PUSH PIN)

⊕400803 AC POLE FACE
⊕400965 DC POLE FACE

✱⊕400809 PUSH PIN

⊕591452 ARMATURE & PIN S/A

⊕596064 SPRING

⊕●400815 GASKET

COIL S/A
(SEE TABLE)

⊕591453 MANUAL PLUNGER

▲262326 "O" RING

⊕▲262344 "O" RING

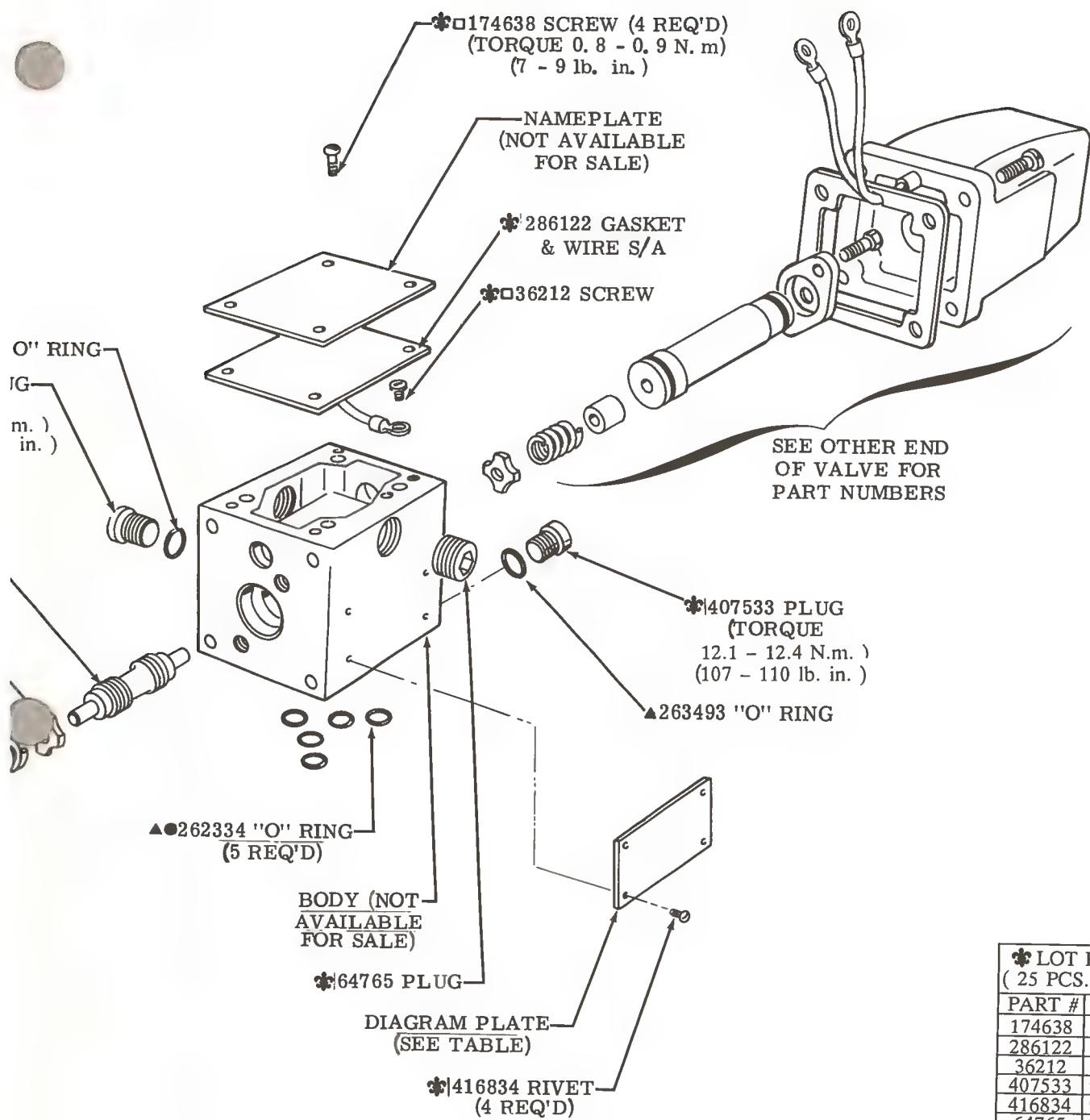
⊕400802 CORE TUBE S/A

⊕▲166360 "O" RING

400807 FLANGE (ASSEMBLE
CHAMFER TOWARD BODY)

□1250 SCREW (2 REQ'D)
(TORQUE 29.8 - 38.0 N.m.)
(264 - 336 lb. in.)

□●577726 SCREW (2 REQ'D)
(TORQUE 1.4 - 1.8 N.m.)
(12-16 lb. in.)



* LOT KITS (25 PCS. ONLY)	
PART #	KIT #
174638	944054
286122	944043
36212	944053
407533	944040
416834	944027
64765	944042
400809	926310

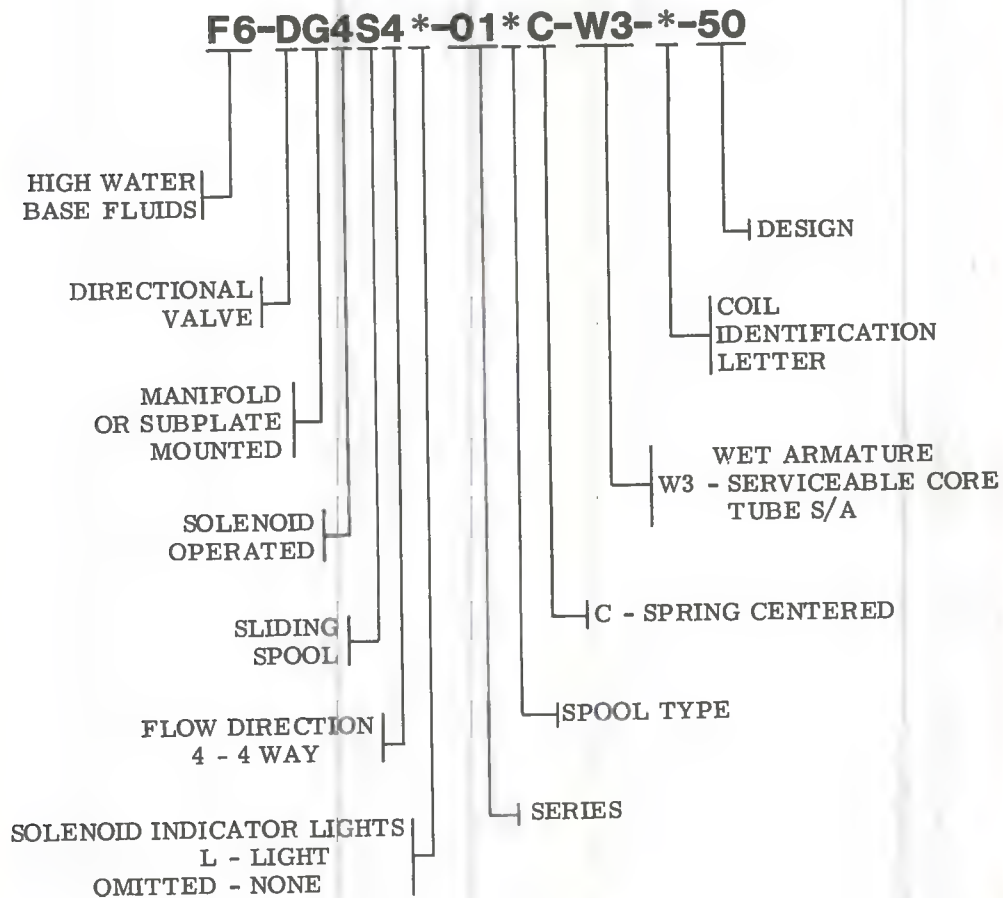
▲ INCLUDED IN
 F3 SEAL KIT 920109

□ INCLUDED IN
 FASTENER KIT 942465

○ INCLUDED IN 941493 AC CORE TUBE KIT
○ INCLUDED IN 941416 DC CORE TUBE KIT

● INCLUDED IN COIL KIT			
● COIL S/A	COIL KIT	AC VOLT/Hz	COIL CODE
400823	942466	110/50, 115/60, 120/60	B
400824	942467	220/50, 230/60	D
400825	942468	440/50, 460/60	M
435755	941017	127/50	EG

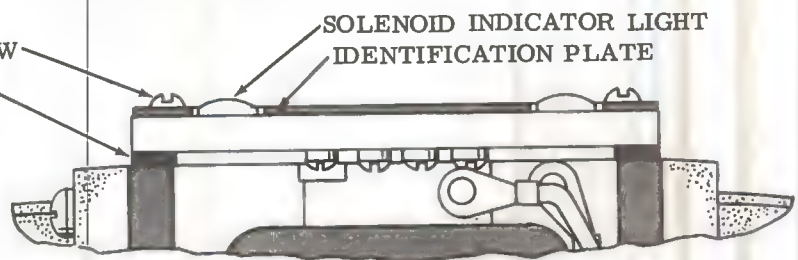
MODEL CODE BREAKDOWN



FOR MODELS WITH SOLENOID INDICATOR LIGHTS

SOLENOID INDICATOR LIGHT KIT (INCLUDES ALL PARTS IDENTIFIED)	
VOLTAGE RANGE	KIT
100 thru 127	941615
192 thru 233	941617

298785 SCREW
298782 GASKET



NOTE
REFER TO PARTS DRAWING I-3487-S
FOR MODELS WITH PLUG-IN FEATURE.

To insure sustained efficiency and maximum trouble-free life of this precision equipment, initial and continuous filtration of the fluid medium to 25 microns absolute or less is essential. (For information pertaining to Vickers economical filters, see bulletin 81-216.)

Litho in U.S.A.

Service Parts Information

Wet Armature
Solenoid Operated
Directional Valve

DG4S4-01*(*)B/C-W3-*-50



Vickers, Incorporated

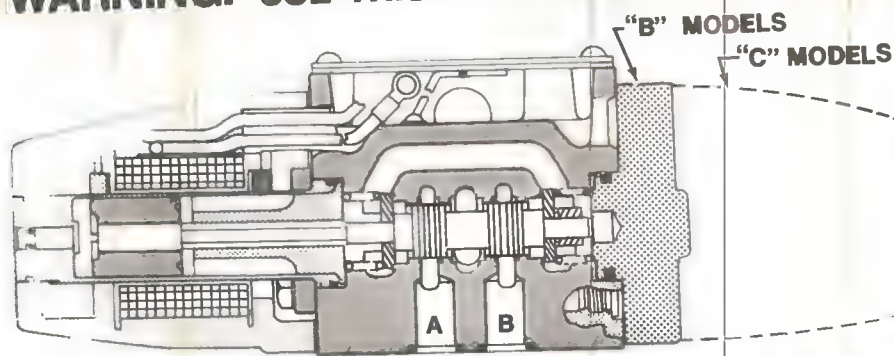
1401 Crooks Road
Troy, Michigan 48064

Revised 10-1-88

I-3558-S

100

WARNING: USE THIS DRAWING FOR PARTS INFORMATION ONLY.



DG4S4-01*B/C-W-*-50

◆ A TYPE '68' SPOOL KIT IS THE SAME AS TYPE '6' EXCEPT A DIFFERENT DIAGRAM PLATE AND THE 'B' MODEL SOLENOID IS ASSEMBLED THE OPPOSITE END OF THE VALVE. A PILOT VALVE IS REQUIRED FOR A (C) SPURTERED TWO STAGE VALVE WITH '4' OR MAIN STAGE SPOOLS.

A TYPE '78' SPOOL KIT IS THE SAME AS TYPE '7' EXCEPT A DIFFERENT DIAGRAM PLATE. A TYPE '78' PILOT VALVE IS REQUIRED PRESSURE CENTERED TWO STAGE VALVE OR '8' TYPE MAIN STAGE SPOOLS.

MODEL	SPOOL	DIAGRAM PLATE	SPOOL KIT
DG4S4-010B/C-W-*-50	463385	290341	940711
DG4S4-011B/C-W-*-50	463386	290342	940712
DG4S4-012B/C-W-*-50	463387	290343	940713
DG4S4-013B/C-W-*-50	463388	290344	940714
DG4S4-016B/C-W-*-50	463389	290345	940715
DG4S4-0168B/C-W-*-50		577480	◆941014
DG4S4-017B/C-W-*-50	463390	290346	940716
DG4S4-0178B/C-W-*-50		577482	◆941015
DG4S4-018B/C-W-*-50	463391	290340	940717
DG4S4-0133B/C-W-*-50	463392	577484	940718

ASSEMBLE TYPE 1 SPOOL WITH RELIEVED LAND TOWARD "A" PORT.
ASSEMBLE TYPE 3 SPOOL WITH NARROW LAND TOWARD "A" PORT.

SPOOL KIT INCLUDES SPOOL, DIAGRAM PLATE, SEAL KIT AND PARTS PREFIXED WITH A CLOSED SQUARE SYMBOL (■).

COIL TYPE	"W" NON-SERVICEABLE	"W3" SERVICEABLE
AC	Δ 926593	941034
DC	—	941035

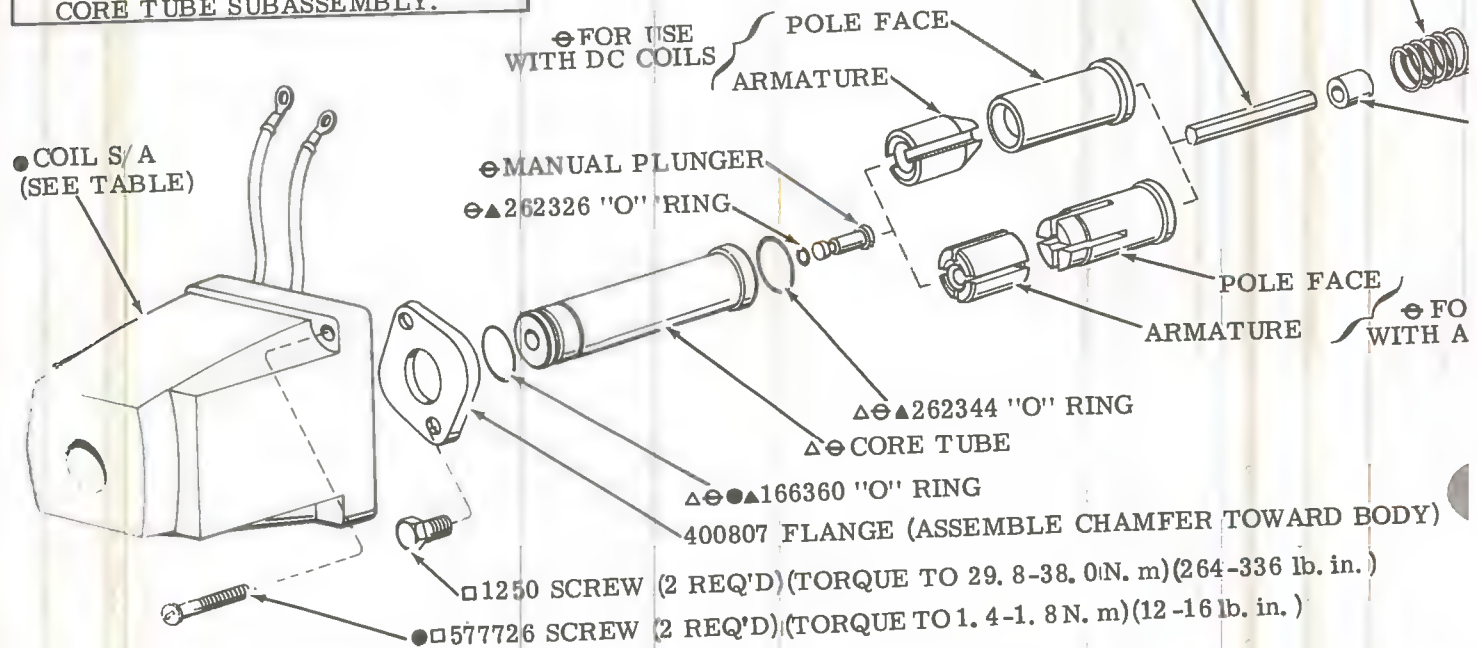
⊖ INCLUDED IN SERVICEABLE (W3) CORE TUBE SUBASSEMBLY.

NOTE
RIGHT HAND ASSEMBLY SHOWN (B MODELS). FOR LEFT HAND ASSEMBLY ALL PARTS, EXCEPT BODY, ARE REVERSED. EXAMPLE OF LEFT HAND MODEL: DG4S4-012B-W-50.

Δ ASSEMBLE WASHER WITH SHARP BREAK EDGE TOWARD OUTSIDE OF VALVE.

- SPOOL (SEE TABLE)
- Δ ■ 400816 WASHER
- 290072 SPRING
- 217323 SPRING (DG4S4-018 ONLY)

- Δ ⊖ 400809 PUSH PIN (2 REQ'D C MODELS) (1 REQ'D B MODELS)

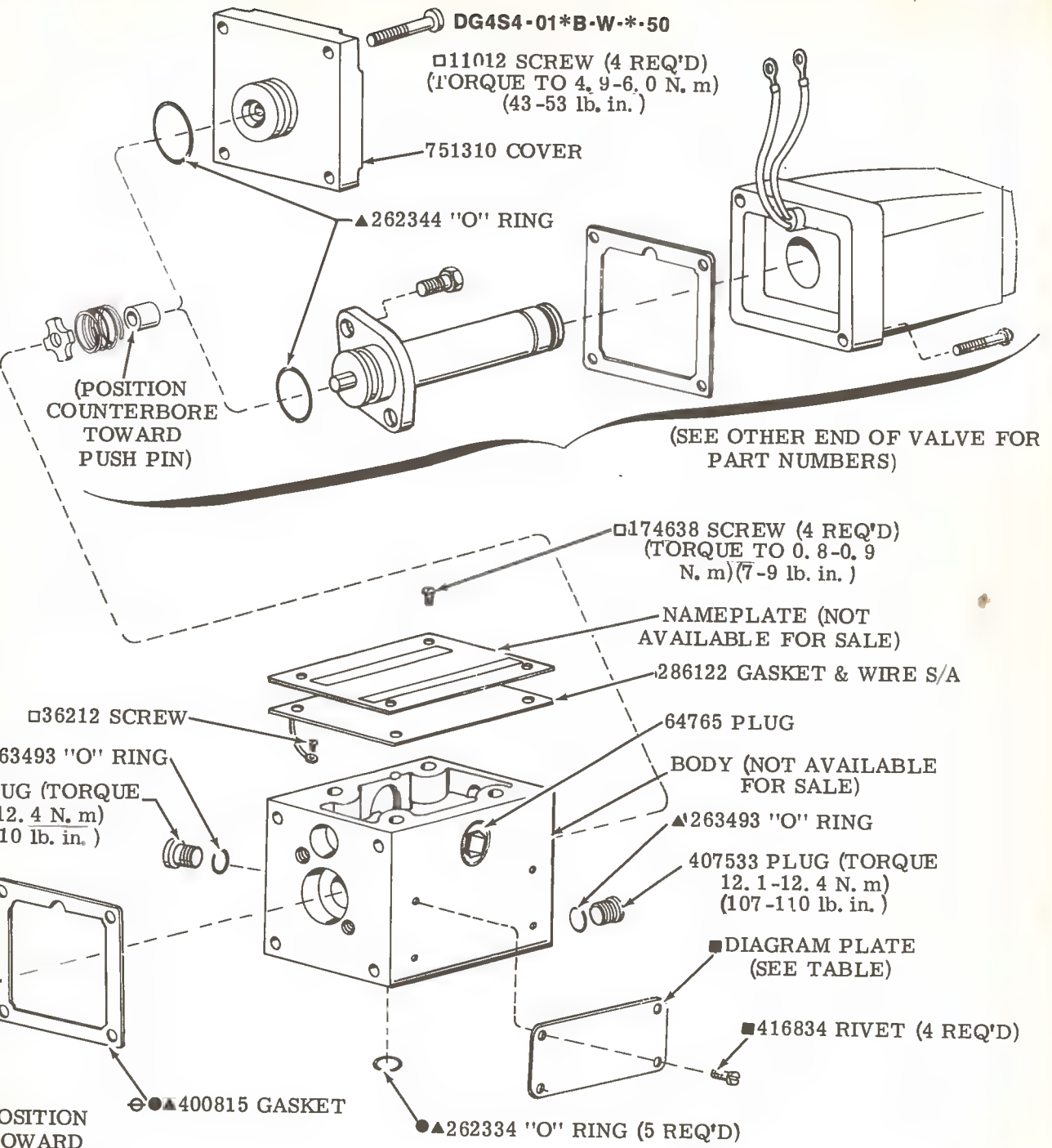


TYPE
3 USED
ED ON
PE '68'
3 CEN-
TYPE

TYPE
3 USED.
R A (D)
ITH '4'

HAND
SED.
.LH.

3395 SPACER (POSITION
COUNTERBORE TOWARD
PUSH PIN)(OMIT FOR "B"
MODELS)



NOTE
PART NUMBERS PREFIXED WITH
A SYMBOL ARE AVAILABLE ONLY
AS SERVICE KITS.

✳ SUFFIX SYMBOL PERTAINS ONLY
TO VICKERS MATERIAL CONTROL

▲ SERVICE ALL UNITS
W/F3 SEAL KIT 920109

□ INCLUDED IN 942465
FASTLINE KIT

● INCLUDED IN COIL KIT					
● COIL S/A	COIL KIT	AC VOLT/Hz	DC VOLT	COIL CODE	
400823	942466	110/50, 115/60, 120/60	—	B	
400824	942467	220/50, 230/60		D	
400825	942468	440/50, 460/60		M	
400826	942469	—	12	G	
400827	942470		24	H	
435755	941017	127/50	—	EG	
582214	941109	—	250	X	
730273	926461		48	J	

***CAUTION**
CORRECT ARMATURE AND POLE FACE MUST BE
USED FOR AC AND DC OPERATION.

MODEL CODE BREAKDOWN

(F3) - DG 4 S4 * -01 * *-W3 *-50 -(LH)

MULTI-FLUID
CAPABILITY
(VITON SEALS)

DIRECTIONAL
VALVE

MANIFOLD OR
SUBPLATE
MOUNTING

SOLENOID
OPERATED

SLIDING
SPOOL

FLOW DIRECTION
4 - 4 WAY

SOLENOID INDICATOR LIGHTS
L - LIGHT
(OMITTED - NONE)

LEFT HAND ASSEMBLY
"B" MODELS ONLY

DESIGN
NUMBER

COIL
IDENTIFICATION
LETTER

WET ARMATURE TYPE
W - NONSERVICEABLE
CORE TUBE S/A
W3 - SERVICEABLE CORE
TUBE S/A

B - SPRING CENTERED /
ONE SOLENOID
C - SPRING CENTERED

SPOOL TYPE

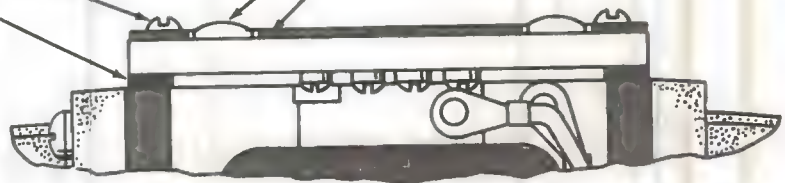
SERIES

FOR MODELS WITH
SOLENOID INDICATOR LIGHTS

298785 SCREW
298782 GASKET

SOLENOID INDICATOR LIGHT
IDENTIFICATION PLATE

SOLENOID INDICATOR LIGHT KIT (INCLUDES ALL PARTS IDENTIFIED)	
VOLTAGE RANGE	KIT
100 thru 127	941615
192 thru 233	941617



NOTE
REFER TO PARTS DRAWING I-3487-S
FOR MODELS WITH PLUG-IN FEATURE.

For satisfactory service life of these components in industrial applications, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from Vickers OFP, OFR, and OFRS series are recommended.

Litho in U.S.A.

VICKERS®
A TRINOVIA COMPANY

Service Parts Information

Wet Armature
Solenoid
Operated
Directional
Valves

DG4S*-01*N-W(3)*-51



Vickers, Incorporated

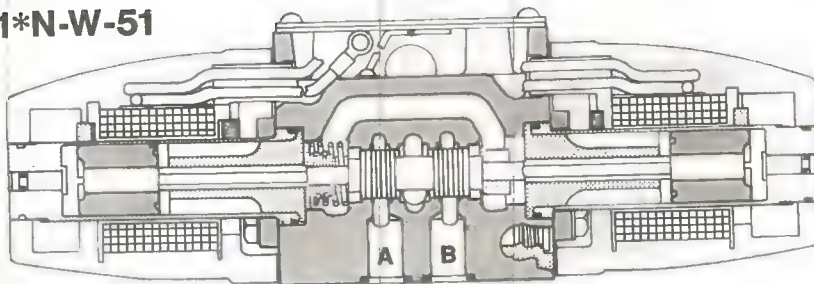
P.O. Box 302
Troy, Michigan 48007-0302

Revised 12-1-87

I-3559-S

101

DG4S*-01*N-W-51



MODEL	SPOOL	DIAGRAM PLATE	SPOOL KIT
DG4S2-012N-W-*-51	463393	577485	940702
DG4S4-010N-W-*-51	587970		940706
DG4S4-012N-W-*-51	587971	577486	940707
DG4S4-016N-W-*-51	587972		940708
DG4S4-017N-W-*-51	587973		940709
DG4S4-0133N-W-*-51	587974		940710

SPOOL KIT INCLUDES SPOOL, DIAGRAM PLATE, SEAL KIT AND PARTS PREFIXED WITH A CLOSED SQUARE SYMBOL (■).

NOTE
PART NUMBERS PREFIXED WITH A SYMBOL ARE AVAILABLE ONLY AS SERVICE KITS.

COIL TYPE	CORE TUBE S/A	
	"W" NON-SERVICEABLE	☉ "W3" SERVICEABLE
AC	587259	941034
DC		941035

☉ INCLUDED IN SERVICEABLE (W3) CORE TUBE SUBASSEMBLY.

▲SERVICE ALL UNITS
W/F3 SEAL KIT 920109

△INCLUDED IN
941016 DETENT KIT

□INCLUDED IN
FASTENER KIT 942465

△ SPRING

△ SNAP RING

△ DETENT

☉ 400809 PUSH PIN (2 REQ'D)
(NOT INCLUDED AS PART OF NON-SERVICEABLE CORE TUBE S/A)

☉ FOR USE WITH DC COILS } POLE FACE
ARMATURE

☉ MANUAL PLUNGER

☉ ▲262326 "O" RING

☉ ▲262344 "O" RING

☉ CORE TUBE S/A

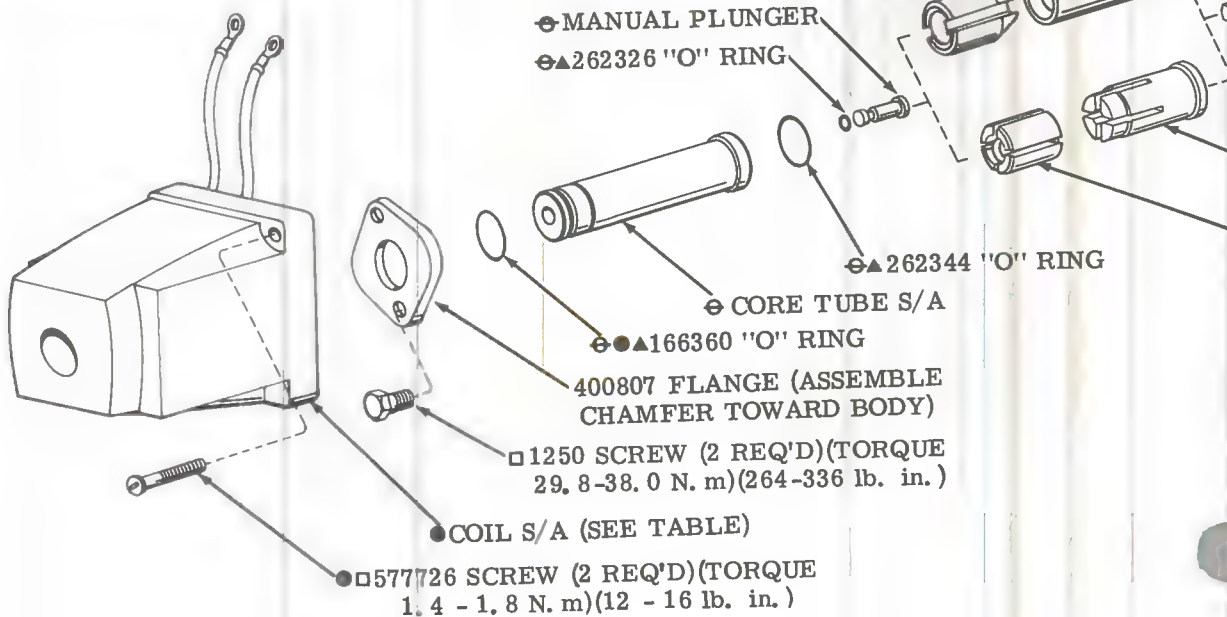
☉ ●▲166360 "O" RING

400807 FLANGE (ASSEMBLE CHAMFER TOWARD BODY)

□ 1250 SCREW (2 REQ'D) (TORQUE 29.8-38.0 N.m) (264-336 lb. in.)

● COIL S/A (SEE TABLE)

● □ 577726 SCREW (2 REQ'D) (TORQUE 1.4 - 1.8 N.m) (12 - 16 lb. in.)



(SEE OTHER END OF VALVE
FOR PART NUMBERS)

▲262344 "O" RING

■400843 SPACER

286122 GASKET
& WIRE S/A

□36212 SCREW

▲263493 "O" RING

407533 PLUG (TORQUE
12.1 - 12.4 N. m)
(107 - 110 lb. in.)

●▲400815 GASKET

■SPOOL (SEE TABLE) (POLISH SPOOL
END DIAMETER PRIOR TO ASSEMBLY)

□174638 SCREW (4 REQ'D)
TORQUE 0.8-0.9 N. m
(7 - 9 lb. in.)

NAMEPLATE (NOT
AVAILABLE FOR SALE)

BODY (NOT AVAILABLE
FOR SALE)

64765 PLUG

407533 PLUG (TORQUE
12.1 - 12.4 N. m)
(107 - 110 lb. in.)

▲263493 "O" RING

■DIAGRAM PLATE
(SEE TABLE)

■□416834 RIVET
(4 REQ'D)

●▲262334 "O" RING (F3 VITON - 5 REQ'D)

POLE FACE

POLE FACE
POLE FACE
FOR USE WITH
AC COILS

● INCLUDED IN COIL KIT

● COIL S/A	COIL KIT	AC VOLT/Hz	DC VOLT	COIL CODE	DIN COIL
400823	942466	110/50, 115/60, 120/60		B	463328
400824	942467	220/50, 230/60		D	463329
400825	942468	440/50, 460/60		M	463330
400826	942469		12	G	463331
400827	942470		24	H	463332
435755	941017	127/50		EG	
582214	941109		250	X	617244
730273	926461		48	J	
		100/50, 100/60		T	977929
		380/50, 380/60		DZ	617370

*CAUTION
CORRECT ARMATURE AND POLE FACE MUST BE USED
FOR AC AND DC OPERATION.

MODEL CODE BREAKDOWN

(F3) - DG 4 S * * - 01 * N - W (3) - * - 51

SEALS FOR
MINERAL OIL
AND FIRE
RESISTANT
FLUIDS

DIRECTIONAL
VALVE

MANIFOLD OR
SUBPLATE
MOUNTING

SOLENOID
OPERATED

SLIDING
SPOOL

FLOW DIRECTION
2 - WAY
4 - WAY

SOLENOID INDICATOR LIGHTS
L - LIGHT
(OMITTED - NONE)

DESIGN

COIL
IDENTIFICATION
LETTER

WET ARMATURE TYPE
W - NON-SERVICEABLE
CORE TUBE S/A
W3 - SERVICEABLE CORE
TUBE S/A

N - DETENTED

SPOOL TYPE

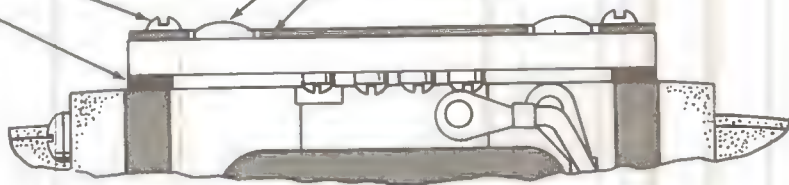
SERIES

FOR MODELS WITH
SOLENOID INDICATOR LIGHTS

298785 SCREW
298782 GASKET

SOLENOID INDICATOR LIGHT
IDENTIFICATION PLATE

SOLENOID INDICATOR LIGHT KIT (INCLUDES ALL PARTS IDENTIFIED)	
VOLTAGE RANGE	KIT
100 thru 127	941615
192 thru 233	941617



NOTE

REFER TO PARTS DRAWING I-3487-S
FOR MODELS WITH PLUG-IN FEATURE.

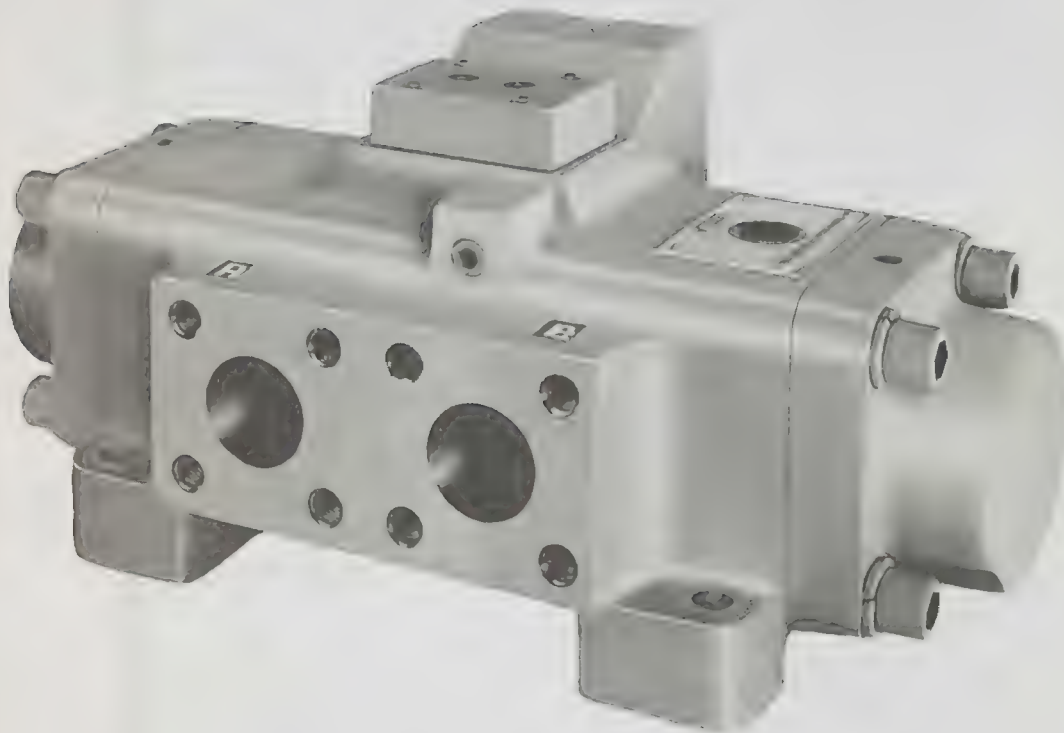
For satisfactory service life of these components, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from Vickers OFP, OFR, and OFRS series are recommended.

Litho in U.S.A.

Service Parts Information

**Pilot
Operated
Directional
Control
Valve**

DF3S4-16**-*-53



Vickers, Incorporated

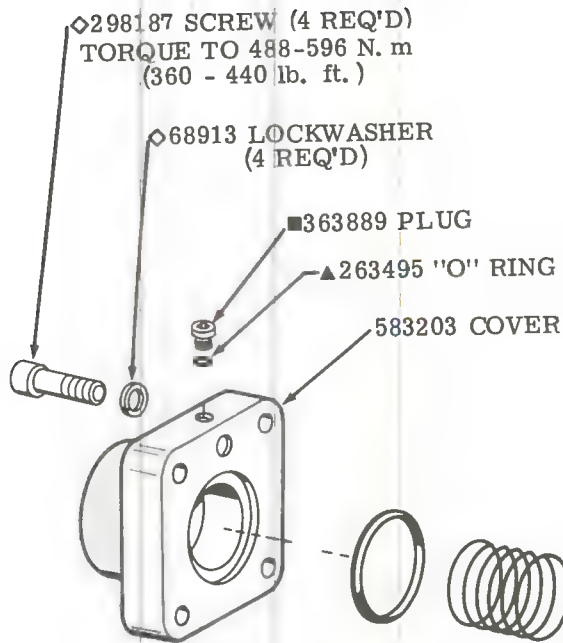
P.O. Box 302
Troy, Michigan 48007-0302

Revised 9-1-85

I-3561-S

102

COVER ATTACHING BOLTS	
MODEL	BOLT (4 REQ'D)
W/PILOT CHOKE	Ø10937
W/OUT PILOT CHOKE	□ 1033
TORQUE TO 12.4 - 12.65 N. m (110 - 112 lb. in.)	



■ PLUG TORQUES (OILED)		
PLUG	N. m	lb. in.
7075	20.0 -23.0	180-205
113000	5.0 - 5.9	45-52
315932	22.5 -27.0	200-240
363889	16.9 -18.0	150-160

■113000 PLUG

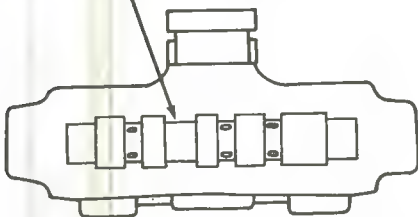
583197 BODY
NOT AVAILABLE
FOR SALE

▲263496 'O' RING (2 REQ'D)

■315932 PLUG (2 REQ'D)

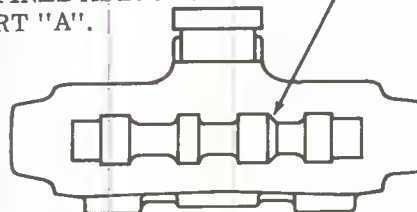
- ▲▲ INCLUDED IN STD. SEAL KIT 919406
- F3 EQUIVALENT SEAL KIT 919410
- ◇ INCLUDED IN FASTENER KIT 941309
- INCLUDED IN BOLT KIT 255651
- Ø INCLUDED IN BOLT KIT 255637
- PLUG TORQUES (SEE TABLE)

ASSEMBLE TYPE 4 & 8 SPOOLS
WITH WIDE UNDERCUT
TOWARD "A" END



ASSEMBLE TYPE 1 & 3 SPOOLS WITH
TAPER TOWARD "B" END

ASSEMBLE TYPE 31 SPOOL WITH TAPER
TOWARD "A" END OF VALVE. "A" END IS
DEFINED AS BEING CLOSEST TO CYL.
PORT "A".



SPOOL ASSEMBLY NOTE

83198 COVER

▲153950 "O" RING
(2 REQ'D)

PILOT CHOKE
(SEE BACK PAGE)

416834 RIVET (4 REQ'D)

IDENTIFICATION PLATE
(W/CIRCUIT DIAGRAM)
(SEE TABLE)

▲173792 "O" RING
(2 REQ'D)

POOL (SEE TABLE)

107755 WASHER (2 REQ'D)

BOTH ENDS ON
RING MODELS

279241 SPRING (2 REQ'D)

▲154089 "O" RING (2 REQ'D)

583203 COVER

■363889 PLUG

▲263495 "O" RING

◇68913 LOCKWASHER
(4 REQ'D)

298187 SCREW
(4 REQ'D)
TORQUE TO
488-596 N. m
(360-440 lb. ft.)

MODEL	SPOOL	IDENT. PLATE	
		"C"	NO-SPRING
DF3S4-160(C)-*-53	273677	400976	400975
DF3S4-161C-*-53	*386581	400977	—
DF3S4-162(C)-*-53	273676	400978	400975
DF5S4-163C-*-53	*275803	400979	—
DF3S4-164C-*-53	*273720	400980	—
DF3S4-166(C)-*-53	275804	400981	400975
DF3S4-168C-*-53	*275805	400980	—
DF3S4-169(C)-*-53	275806	400976	400975
DF3S4-1631C-*-53	275803	580475	—
DF3S4-1633C-*-53	317777	400981	—

* SEE SPOOL ASSEMBLY NOTE BELOW

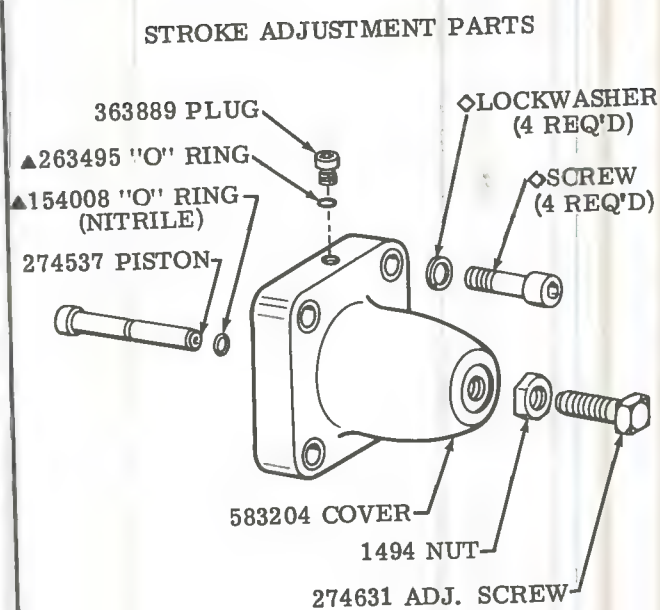
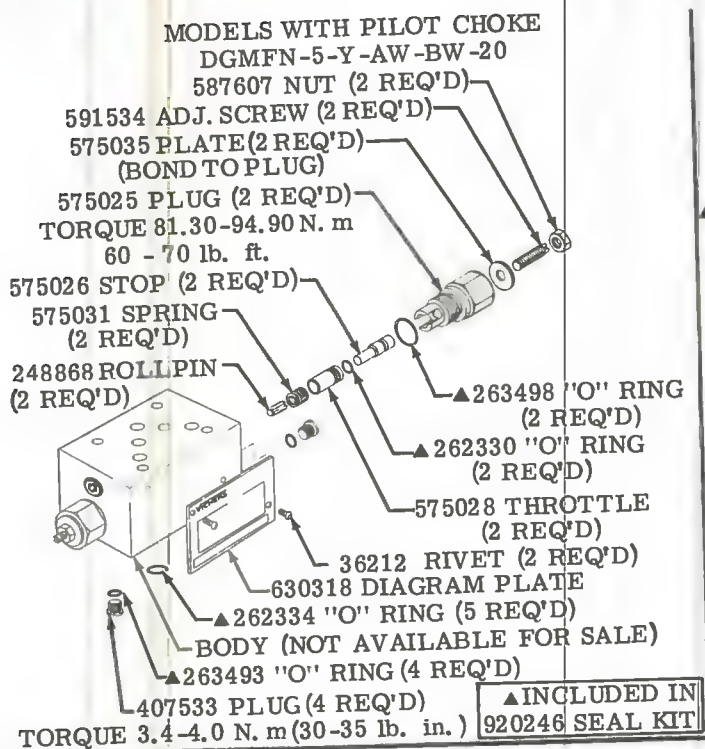
NOTE
PART NUMBERS INCLUDED IN KITS
WILL NOT BE SOLD SEPARATELY

NOTE
SAE STRAIGHT THREAD PLUGS
USED ON EXTERIOR OF VALVE

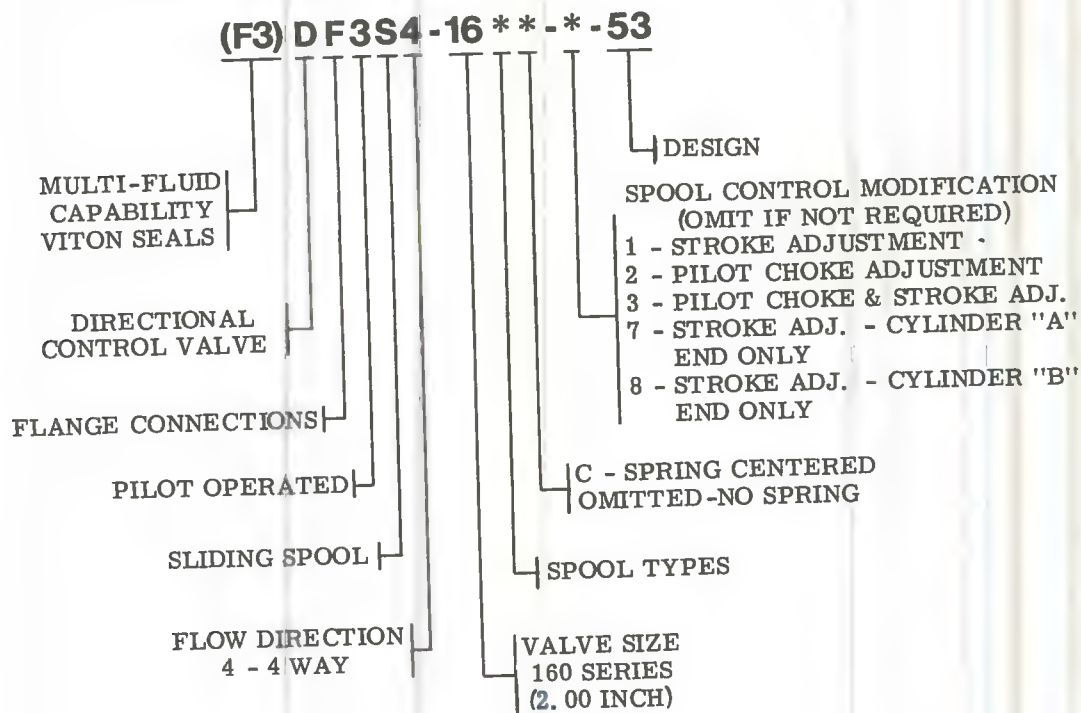
▲INCLUDED IN
919406 SEAL KIT

F3 EQUIVALENT
SEAL KIT 919410

SEE PARTS DRAWING I-3962-S
FOR CONNECTION FLANGES



MODEL CODE BREAKDOWN

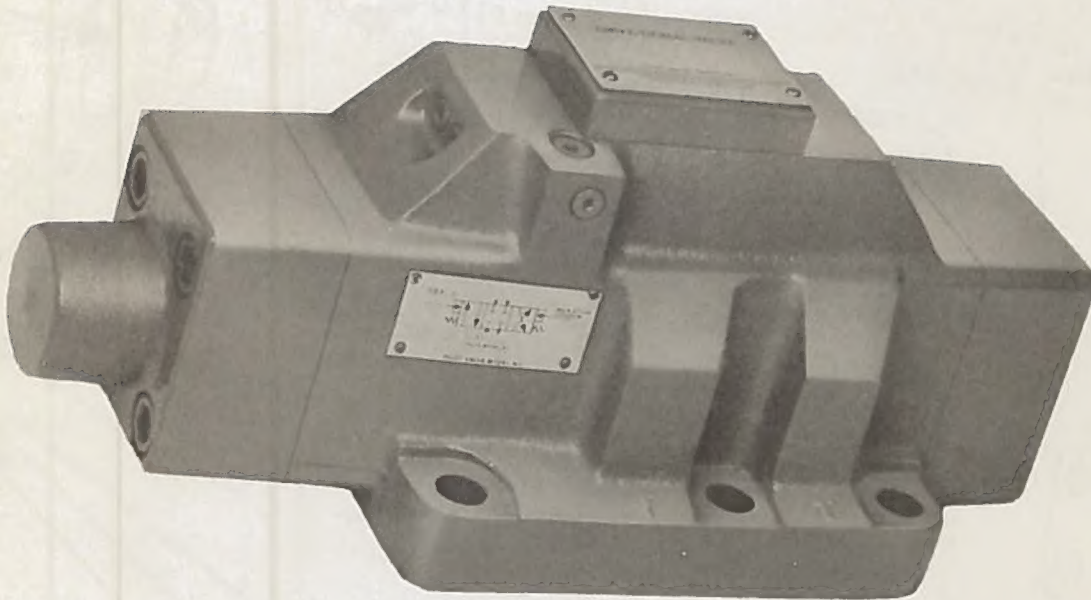


For satisfactory service life of these components in industrial applications, use full flow filtration to provide fluid which meets ISO cleanliness code 18/15 or cleaner. Selections from Vickers OFP, OFR, and OFRS series are recommended.

Service Part Information

Spring Offset
Pilot Operated
Directional
Valve

DG3S4-10*A(X)-*-*-53



porated

1401 Crooks Road
Troy, Michigan 48084

Revised 9-1-85

I-3563-S

A Libbey-Owens-Ford Company

103

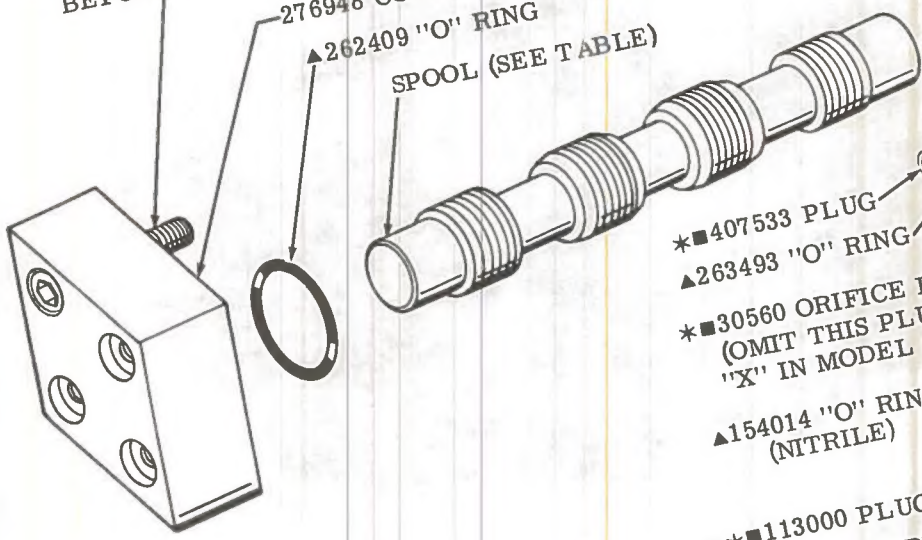
SEAL KIT NOTE
 Kits are manufactured as shown with F3
 Interface seals are standard Nitrile
 sealed to F3 in the seal kit. All seals

TORQUES (OILED)			
PLUG	N. m.	lb. in.	
7074	8.5 - 9.6	75-85	
30560	8.5 - 9.6	75-85	
113000	5.0 - 5.9	45-52	
343740	10.0 - 11.8	90-105	
363889	16.9 - 18.0	150-160	
398071	3.4 - 4.0	30-35	
407533			

MODEL	SPOOL
DG3S4-100A-53	364037
DG3S4-102A-53	364038
DG3S4-106A-53	364039
DG3S4-109A-53	277563
DG3S4-1033A-53	364042

◇ 298168 SCREW (4 REQ'D) (TORQUE
 203.4 - 230.5 N. m 150-170 lb. ft.)
 (REFER TO CAUTION PLATE
 ON OTHER END OF VALVE
 BEFORE REMOVAL)

276948 COVER
 ▲ 262409 "O" RING
 SPOOL (SEE TABLE)



MODEL	SPRING
DG3S4-10*A-K-53	◇ 247287
DG3S4-10*A-L-53	◇ 247288
DG3S4-10*A-R-53	◇ 276428
DG3S4-10*A-S-53	◇ 432353

● 267966 SCREW (4 REQ'D)
 NAMEPLATE
 ● 323656 COVER

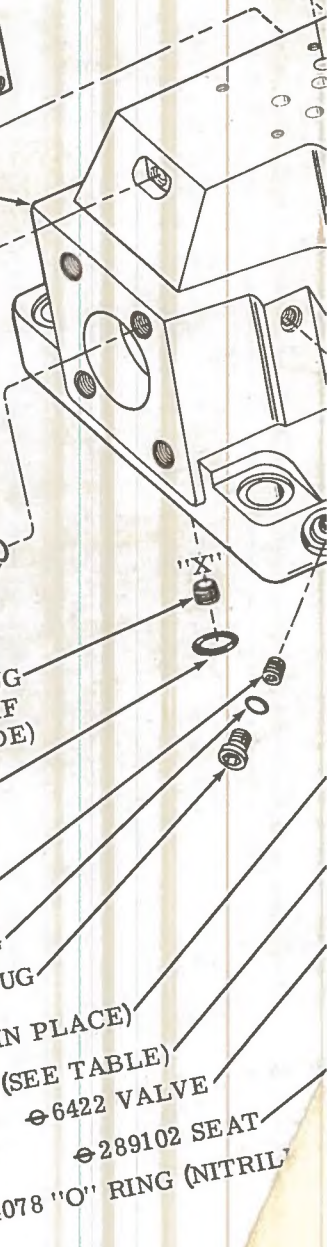
*■ 7074 PLUG
 *■ 407533 PLUG
 ▲ 263493 "O" RING

400960 I.D. PLATE (RIGHT HAND)
 434311 I.D. PLATE (LEFT HAND)
 416834 RIVET (4 REQ'D)

◆ 400959 BODY (STD)
 ◆ 435503 BODY (CHECK VLV)
 ▲ 263493 "O" RING
 *■ 407533 PLUG

*■ 407533 PLUG
 ▲ 263493 "O" RING
 *■ 30560 ORIFICE PLUG
 (OMIT THIS PLUG IF
 "X" IN MODEL CODE)
 ▲ 154014 "O" RING
 (NITRILE)

◇ *■ 113000 PLUG
 ▲ ◇ 263493 "O" RING
 ◇ *■ 407533 PLUG
 ◇ 245802 SLEEVE (PRESS IN PLACE)
 ◇ SPRING (SEE TABLE)
 ◇ 6422 VALVE
 ◇ 289102 SEAT
 ▲ ◇ 154078 "O" RING (NITRILE)



W/OUT PILOT CHOKE	BOLTS
W/PILOT CHOKE	BOLT
(SEE BACK PAGE)	(4 REQ'D)
TORQUE TO 11.3 - 12.7 N.m	□ 1031
(100 - 112 lb. in.)	⌀ 10935

◇ 298168 SCREW (4 REQ'D) (TORQUE 203.4-230.5 N.m 150-170 lb. ft.) (REFER TO CAUTION PLATE BEFORE REMOVAL)

416834 RIVET (4 REQ'D)

408491 CAUTION PLATE

● ▲ 262342 "O" RING (2 REQ'D)

* ■ 363889 PLUG

▲ 263495 "O" RING

* ■ 407533 PLUG

▲ 263493 "O" RING

▲ 263493 "O" RING (2 REQ'D)

* ■ 407533 PLUG (2 REQ'D)



110541 OUTER SPRING

408322 INNER SPRING



▲ 262409 "O" RING



278467 COVER

▲ 263493 "O" RING (2 REQ'D)

* ■ 407533 PLUG (2 REQ'D)

* ■ 7074 PLUG

▲ 263495 "O" RING

* ■ 363889 PLUG

195940 REST PIN (2 REQ'D)

▲ 154014 "O" RING (NITRILE)

▲ 263493 "O" RING

* ■ 407533 PLUG

■ 343740 PLUG

"O" RING

ING (NITRILE)

HECK VALVE

D STD MODELS,

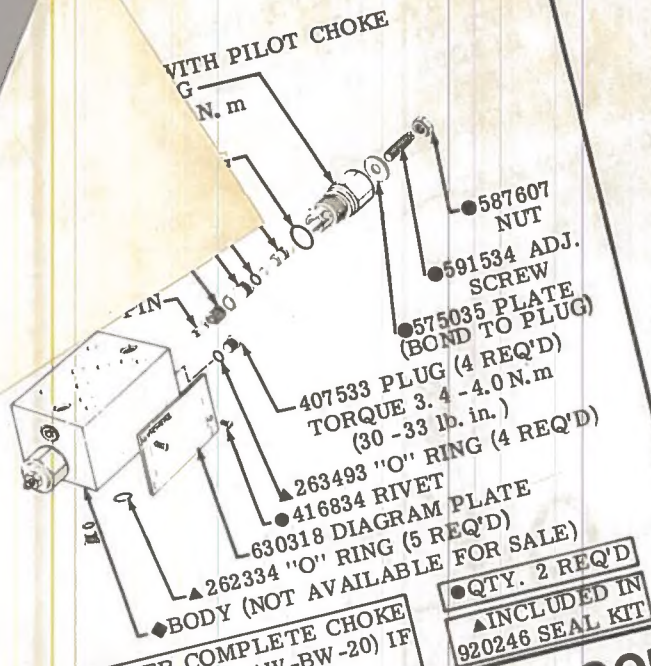
T PORTS)

NOTE
SAE STRAIGHT THREAD PLUGS
USED ON EXTERIOR OF VALVE

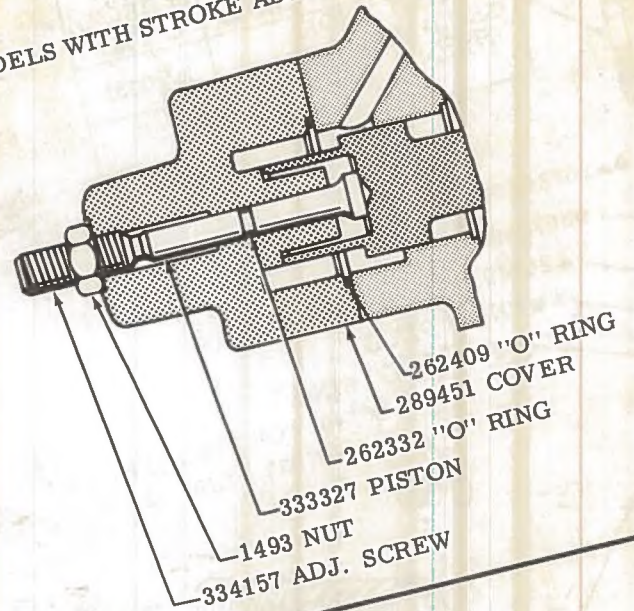
NOTE
PART NUMBERS INCLUDED IN
KITS WILL NOT BE SOLD SEPARATELY.

- ▲ INCLUDED IN F3 SEAL KIT 920150
- INCLUDED IN FASTENER KIT 941257
- ◇ INCLUDED IN FASTENER KIT 941262
- ⌀ INCLUDED IN BOLT KIT 255620
- INCLUDED IN COVER KIT 942024
- * INCLUDED IN PLUG KIT 941263
- PLUG TORQUES (SEE TABLE)
- ◆ NOT AVAILABLE FOR SALE
- ⊕ USED ON CHECK VALVE MODELS ONLY

NOTE
RIGHT HAND ASSEMBLY SHOWN. FOR LEFT
HAND ASSEMBLY, END COVERS AND SPRINGS
ARE REVERSED AND I.D. PLATE CHANGED
TO L.H. Ex. DG3S4-100A-53-LH.



MODELS WITH STROKE ADJUSTMENT



MODEL CODE BREAKDOWN

(F3)DG3S4 - 10 * A (X) - * - * - 53 - (LH)

MULTI-FLUID
CAPABILITY
(VITON SEALS)

DIRECTIONAL
CONTROL
VALVE

SUBPLATE OR
MANIFOLD
MOUNTED

PILOT OPERATED

SLIDING SPOOL

FLOW DIRECTION
4 - 4 WAY

VALVE SIZE
100 SERIES
(1.250 INCH)

OFFSET TO "B"
OMIT FOR STD.
OFFSET TO "A"
MODELS

DESIGN CHECK VALVE
K - 5 PSI (0.35 bar) CRACKING PF
L - 35 PSI (2.4 bar) CRACKING PF
R - 50 PSI (3.45 bar) CRACKING P
S - 75 PSI (5.2 bar) CRACKING I
OMITTED - NO CHECK VALVE

SPOOL CONTROL MODIFICATION
(OMIT IF NOT REQUIRED)
2 - PILOT CHOKE ADJUSTMENT
7 - STROKE ADJ. - CYLINDER
ONLY (RIGHT HAND MOD)
8 - STROKE ADJ. - CYLINDER
ONLY (LEFT HAND MOD)
2-7 - IF BOTH ARE REQUIRED
2-8 - IF BOTH ARE REQUIRED

"X" - FAST RESPONSE MOD
OMITTED - LOW SHOCK MOD

SPRING OFFSET

SPOOL TYPES

For satisfactory service life of these components, use full flow filtration cleanliness code 18/15 or cleaner. Selections from Vickers OFP, OFR, and O.